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INTERNATIONAL LASER SYSTEMS INC ORLANDO FL

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MAGLAD. TRAINER ENGINEERING REPORT DEMONSTRATION RESULTS.(U)

MAR 77 D R WOODS

N61339-76-C-0116

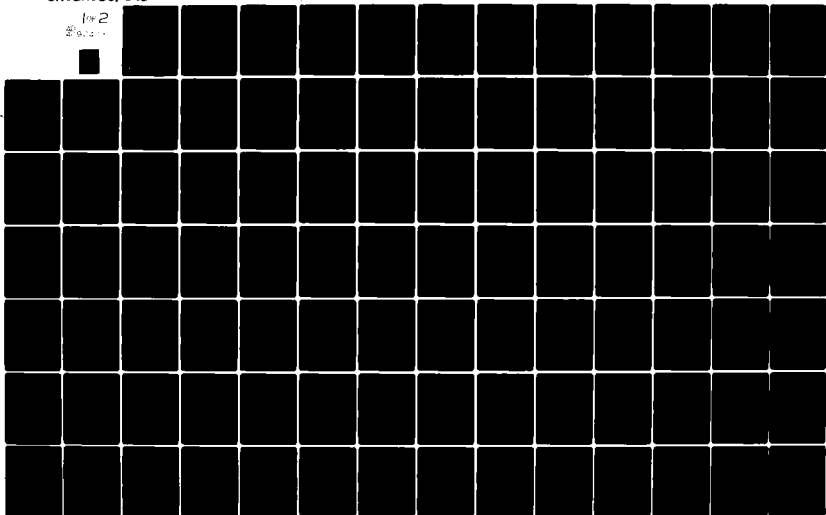
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REPORT N61339-76C-0116

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MAGLAD

TRAINER ENGINEERING REPORT
DEMONSTRATION RESULTS

D. R. WOODS
International Laser Systems, Inc.
3404 N. Orange Blossom Trail
Orlando, Florida 32804

29 March 1977

FILE
MAGLAD
43

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NTEC N-2234
Orlando, Florida 32813

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Accuracy of Alignment Tolerance Effective Simulation of Firing Service Ammunition at Standard and Scaled Ranges Operation Under Ambient Light Conditions Moving Target Lead Angle Simulation		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report documents the results of the MAGLAD Effective Simulation, Range and Alignment Tolerance Demonstration Test Plan, Report N61339-76C-0116-2		

FOREWORD

This document fulfills the data requirement of CDRL
Item A001AC for a Trainer Engineering Report Demonstration
Results delineating test results for Item 0002.

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SECTION I

SCOPE

1.1 INTRODUCTION

The purpose of this test report is to document results of the Effective Simulation, Range and Alignment Tolerance Demonstration. This report of test results is based on the MAGLAD Effective Simulation, Range and Alignment Tolerance Demonstration Test Plan, Report N61339-76C-0116-2, hereafter referred to as the Demonstration Test Plan.

1.2 TEST DURATION

The demonstration commenced on 14 February and was conducted over a period of days ending with the static moving target tests on 15 March 1977. A total demonstration time of seven days yielded the test results reported herein.

1.3 TEST DATES

The five demonstration tests as outlined in the Demonstration Test Plan, were conducted on the following dates:

- Demonstration of Accuracy of Alignment Tolerance -- test were conducted on 14 and 15 February 1977;
- Effective Simulation of Firing with Service Ammunition at Minimum, Maximum and Intermediate Ranges -- tests began on 22 February and concluded on 23 February 1977;
- Operation Under Ambient Light Conditions -- tests were conducted on 25 February 1977;
- Effective Simulation of Firing with Service Ammunition at Scaled Record Fire Range -- Scale range tests were started on 16 February, but were discontinued when eye safety power measurements made in the afternoon indicated low laser transmitter power. An alternate laser diode was installed and aligned and the scale record fire range demonstration was conducted on 28 February and 1 March 1977.
- Moving Target Lead Angle Simulation Demonstration, Static -- test was conducted on 15 March 1977.

1.4 TEST SITE LOCATIONS

The demonstration tests were conducted at three test site locations; they were as follows:

- The demonstration of accuracy of alignment at 25 m using the Rifle Sight/Laser Alignment Kit and laser transmitter was conducted at a semi-isolated area adjacent to the contractor facility in Orlando, Fla.;
- The 150 and 300 m demonstration of accuracy of alignment and the Effective Simulation of Firing with Service Ammunition at Minimum, Maximum and Intermediate Ranges demonstrations were conducted on a range located on city property, Orlando, Fla.; and
- The Operation Under Ambient Light Conditions, the Scaled Record Fire Range demonstration and the Static Moving Target Lead Angle Simulation demonstration were conducted at the contractor's facility at Orlando, Fla.

1.5 TEST SPECIMENS

The specimens demonstrated were breadboard models of the following:

- Laser Rifle Marksmanship Trainer Device/A3F77 (CLIN 0003);
- Laser Radiation Detectors (CLIN 0003AA);
- Rifle Sight/Laser Alignment Kit (CLIN 0003AB);
- Laser Hit Indicator with Test Target Kit (CLIN 0003AC); and
- Scaled Record Range Targets and Radiation Detector (CLIN 0003AD).

1.6 TEST FIRING

All test firing, during the effective simulation demonstration, were conducted with laser pulses only. Blank firing of the M16A1 was not required.

1.7 SUPPORT CONCEPT

The contractor supplied the personnel and test equipment needed to support the demonstration. The government supplied the necessary GFE M16A1 rifles, two marksmen and test operating personnel in support of the demonstration.

NAVTRAEQUIPCEN N61339-76C-0116-1

1.8 APPLICABLE DOCUMENTS

Applicable documents are the MAGLAD Demonstration Test Plan Report N61339-76C-0116-2 and the trainer specifications detailed in Appendix A, Section 2.0.

1.9 GENERAL REQUIREMENTS

1.9.1 PERSONNEL. All test personnel were cognizant of MAGLAD Effective Simulation Demonstration Test Plan N61339-76C-0116-2.

1.9.2 DOCUMENTATION. The results of all tests were recorded on reproducible data sheets.

SECTION II

DESCRIPTION OF THE TEST RESULTS

2.1 GENERAL

The tests and results are described in the order in which they were conducted.

2.2 DEMONSTRATION OF ACCURACY OF ALIGNMENT

The initial Demonstration of Accuracy of Alignment was conducted on 14 February 1977 at the contractor's facility. Two GFE M16A1 rifles of Colt manufacture were provided by the contractor and two M16A1 rifles, one each GMC and H&R, were provided by the government for the alignment demonstration. The test setup and procedure was as described in paragraph 2.1 of the Demonstration Test Plan. Laser transmitter power had previously been set to 375 MW for engineering field test.

2.2.1 25 METER ALIGNMENT TOLERANCE DEMONSTRATION. A 25 m zeroing target was prepared with a 3/8 in. diameter opening displaced downward 1-3/8 in. from the target aim point to compensate for rifle sight/transmitter parallax. The zeroing target was attached to the test detector with the opening located over the detector active area.

Various marksmen aligned the rifle sights using the Rifle Sight/Laser Alignment Kit and aimed the machine rest mounted rifle at the 25 m zeroing target. The beam centroid was determined and recorded on the alignment tolerance test forms along with other pertinent data. The data is recorded on test forms in the following format:

<u>Column</u>	<u>Description</u>
Start Reference	X-Y positioner location in inches
Left Endpoint	Left hand extreme location of beam detection in inches
Right endpoint	Right hand extreme location of beam detection in inches
Up Endpoint	Upward extreme location of beam detection in inches

<u>Column</u>	<u>Description</u>
Down Endpoint	Downward extreme location of beam detection in inches
Left/Right Centroid	1st no. center point between left/right extremity in inches. LEFT < 8.5 in. < RIGHT 2nd no. displacement from start reference in cm
Up/Down Centroid	1st no. center point between up/down extremity in inches. DOWN < 8.5 in. < UP 2nd no. displacement from start reference in cm

The beam centroid determined above is plotted with a "+" on the Test Record Chart (on reverse side of the test form). A 1.4 cm radius circle is shown on the chart indicating the two sight-click acceptance criteria for the 25 m alignment tolerance.

In going from the rifle-mounted 25 m to the scope/sight transmitter adapter for the 150 and 300 m alignment tolerance demonstration, it was discovered that an incorrect value had been used for sight/transmitter parallax. A value of 1.115 in. should have been used instead of the 1.375 in. used on the test detector zeroing target. As this discrepancy is a known value amounting to 0.66 cm in elevation, the beam centroid has been shown replotted as a "Δ" on the Test Record Chart.

2.2.1.1 Test Group Results. Results of this test group are shown on test data sheets for test 1 through 8 at 25 m and as detailed in the following descriptions.

Test #1, 2, 3, conducted by SFC Mondon using H&R and two different Colt weapons, provided alignment accuracy within one sight click resolution.

Test #4, conducted by SFC Mondon using GMC weapon proved out of tolerance on the first try. The rifle was re-aimed at the zeroing target, again resulting in an out of tolerance condition. The rifle sights were then re-aligned using the sight alignment kit which provided alignment accuracy equivalent to the previous three tests.

Test #5, 6, 7, conducted by SGT Batt using one each Colt, H&R and GMC weapons, provided alignment accuracy within the acceptance criteria.

Test #8, conducted by SGT Batt using a Colt weapon proved to be marginal in alignment tolerance on the first try. The rifle was re-aimed at the zeroing target which resulted in an out of tolerance condition. The rifle sights were then re-aligned using the sight alignment kit and again proved to be marginal. Re-aiming the rifle (without sight adjustment) resulted in a larger discrepancy.

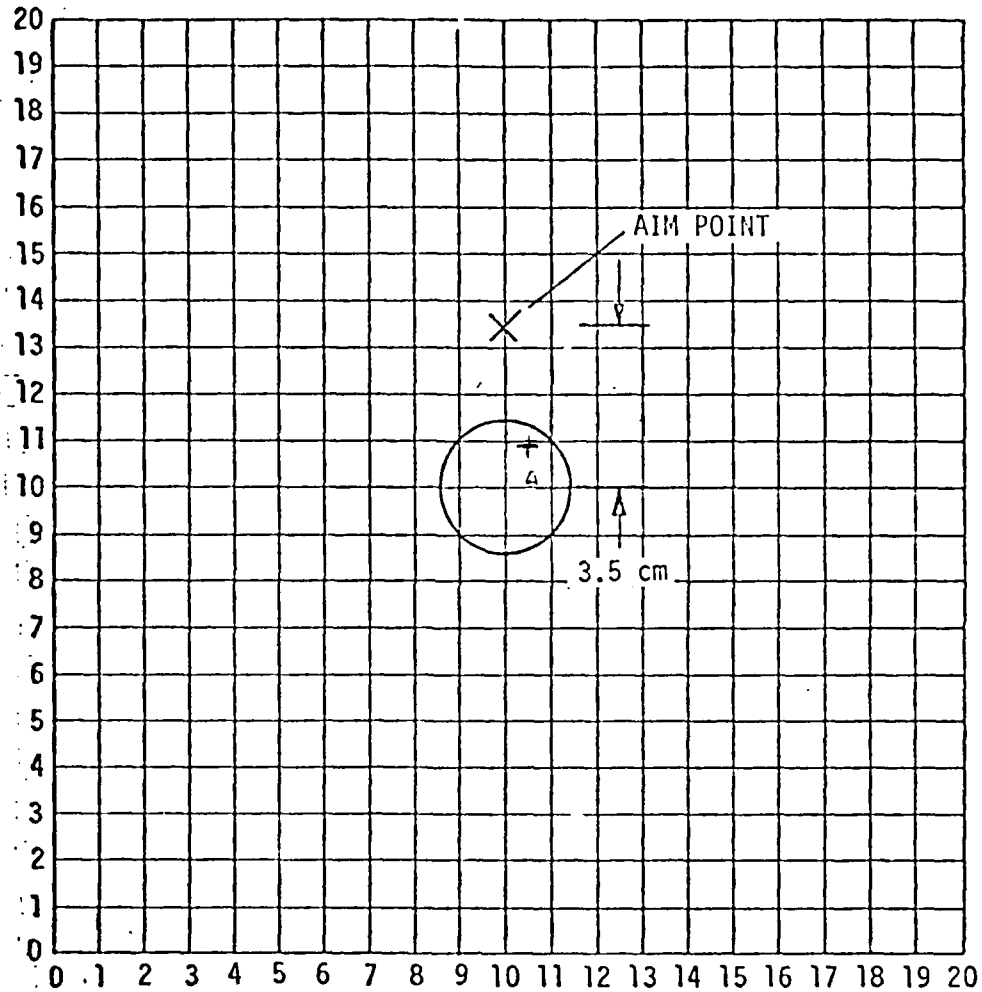
Test #9 - The laser transmitter was rotated about the rifle barrel, to the extreme allowed by the front sight post indexing, while attempting to hold the sight aimpoint on the test target. Transmitter beam centroid shifted by approximately 1/2 cm in elevation and windage from one extreme to the other.

TYPE TEST ALIGNMENT TOLERANCE TEST # 1
 TARGET RANGE 25 M TYPE ZERKING DATE 2/14/77
 TEMPERATURE ~ 60-65 HUMIDITY _____ TIME 1304
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET
 RIFLE S/N 2112793 MFG. H&R
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____
 MARKSMAN SEC MONDON TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY OVERCAST
 TRANSMITTER MOUNTING TIME 2 MIN ALIGNMENT TIME (IRON SIGHTS) 4 MIN ¹³⁰⁴⁻¹³⁰⁶ ^{1314/1322-2}
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT: SEVERAL STOPS
 WINDAGE EAR RIGHT ELEVATION VERY HIGH ¹⁵⁰⁰⁻¹⁵⁰⁵ ^{ABOVE}
4 CLICKS LEFT OF FAR RIGHT EXTREME ^{1005H}

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	7.246	10.205	10.476	7.275	R 8.7105 .53	H 8.875 .95
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DRW

TEST WITNESSED BY: Jack H. Bentley

APPROVAL BY: _____

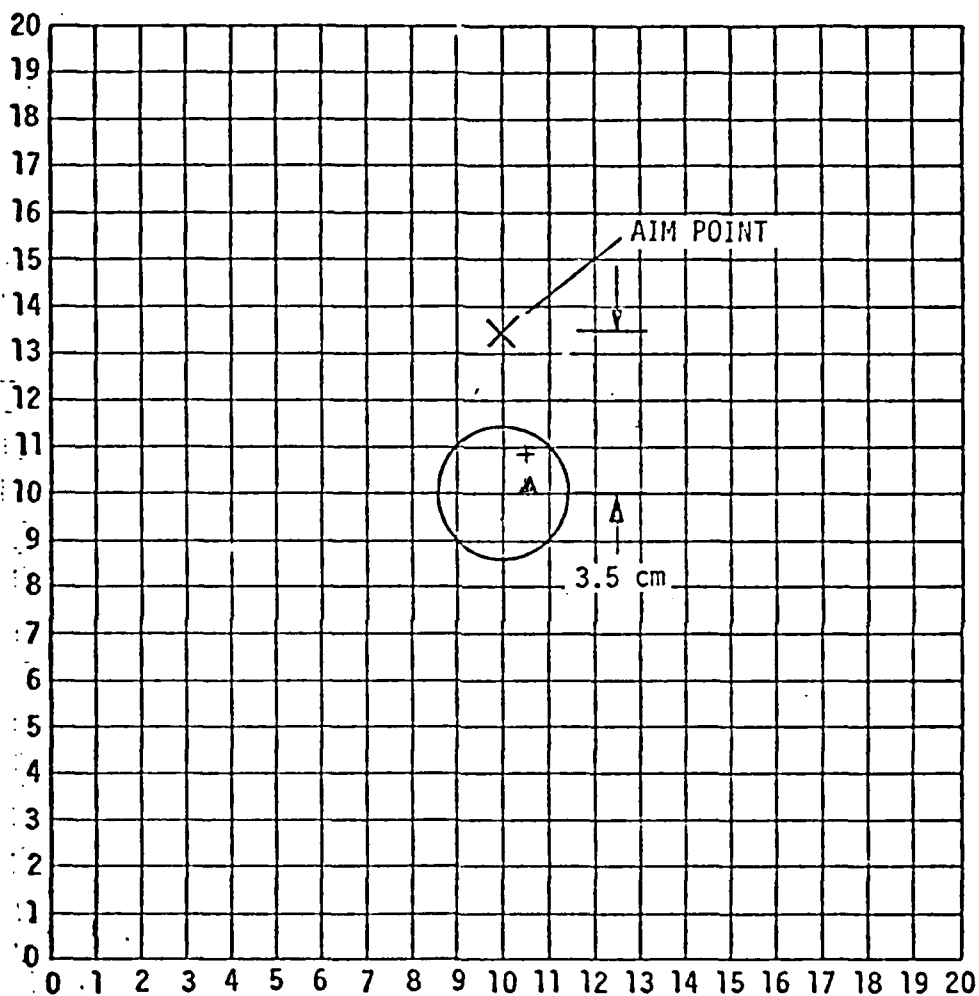
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 2
 TARGET RANGE 25 M TYPE ZEROING DATE 2/14/77
 TEMPERATURE 60-65 HUMIDITY 80% TIME 1330
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET
 RIFLE S/N 4637118 MFG. COLT
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____
 MARKSMAN SFC. MONDON TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY OVERCAST
 TRANSMITTER MOUNTING TIME 1'10" ALIGNMENT TIME (IRON SIGHTS) 2'30"
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE RIGHT ELEVATION HIGH (RANGE ERROR
 2 CLICKS ABOVE FL.)
5 CLICKS LEFT OF AX RIGHT EXTREME

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	7.691	9.289	11.25	8.157		
2	8.5	7.206	10.190	10.449	7.290	8.698	.503
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: E. R. Smith

TEST WITNESSED BY: Jack H. Hartley

APPROVAL BY: _____

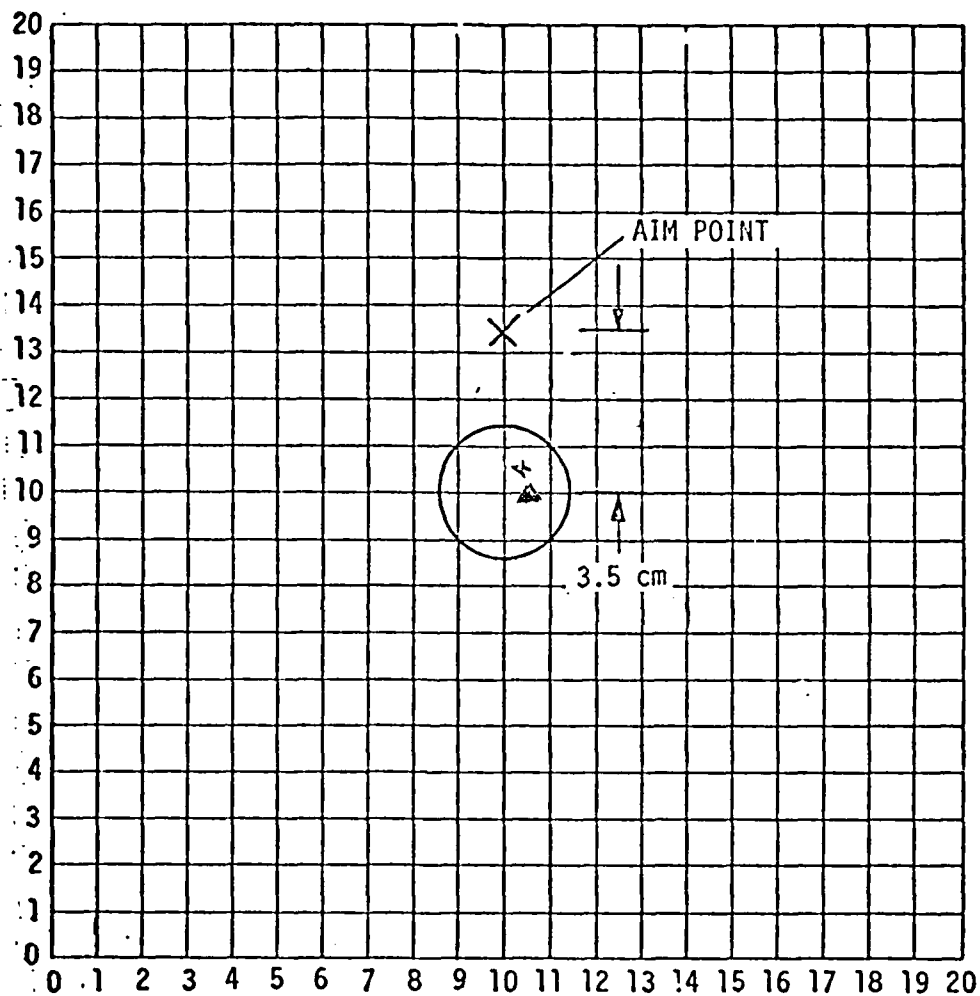
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 3
 TARGET RANGE 25M TYPE ZEPHYRUS DATE 2/14/77
 TEMPERATURE 65-75 HUMIDITY _____ TIME 1340
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET
 RIFLE S/N 463 0048 MFG. COLT
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____
 MARKSMAN SFC MANDON TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY OVERCAST
 TRANSMITTER MOUNTING TIME 29 SEC ALIGNMENT TIME (IRON SIGHTS) 2' 21"
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE RIGHT ELEVATION HIGH 13 CLICKS ABOVE
6 CLICKS LEFT OF FAR RIGHT END

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	7.073	10.199	10.260	7.113	R 8.636 .345	U 8.686 .474
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

P3443

Test Record Chart

TEST CONDUCTED BY: DRW

TEST WITNESSED BY: Joseph H. Hartley

APPROVAL BY: _____

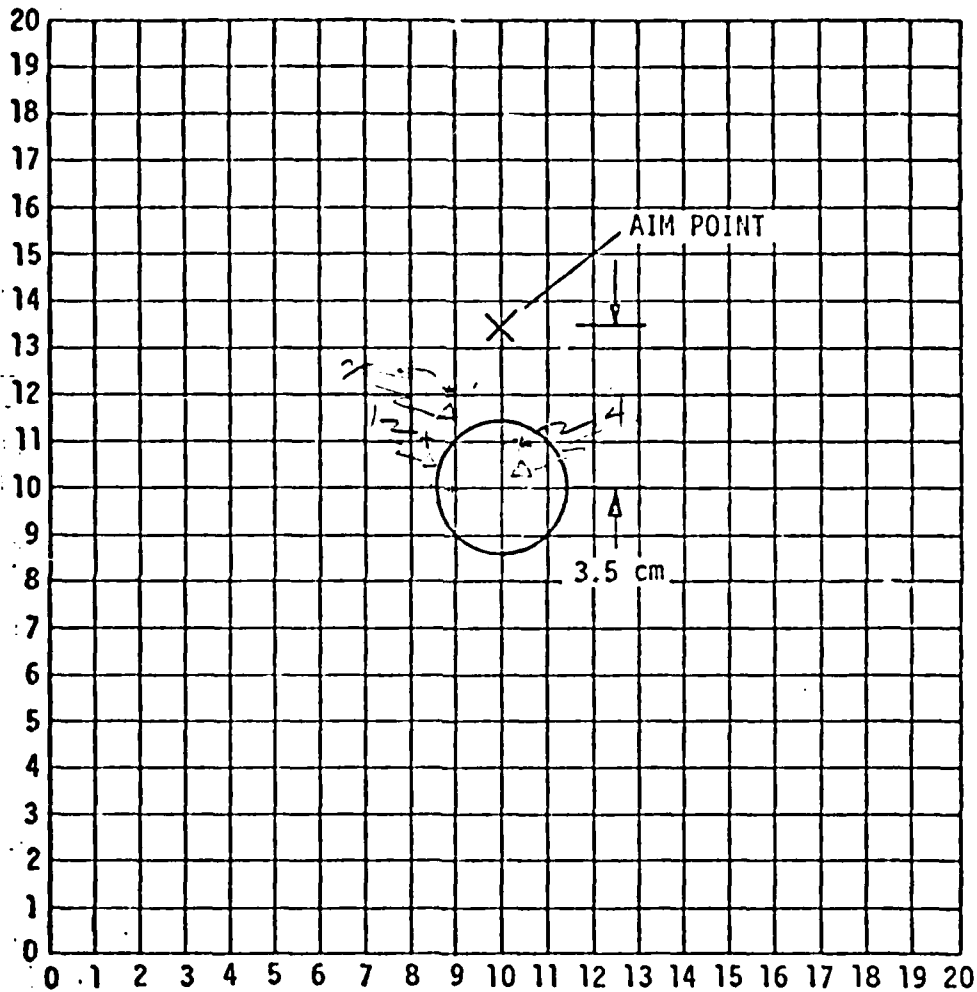
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 4
 TARGET RANGE 25M TYPE ZEROS DATE 5-14-77
 TEMPERATURE 65-65 HUMIDITY 80% TIME 13:50
 TRANSMITTER S/N PRIMITIVE DETECTOR S/N TEST DFT
 RIFLE S/N 3245289 MFG. GMC
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____
 MARKSMAN SFC MONDAN TEST OPERATOR Woods
 ATMOSPHERIC CONDITIONS/EST VISIBILITY 2000 FT
 TRANSMITTER MOUNTING TIME 35 SEC ALIGNMENT TIME (IRON SIGHTS) 2'
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE 2000 FT ELEVATION 17 clicks

#	TEST DETECTOR X-Y POSITION							
	START	ENDPOINT				CENTROID		
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN	
1	8.5	6.282	9.366	10.277	7.585	L 2.874 1.59	U 8.931 1.09	
2	8.5	6.629	9.497	10.747	7.921	L 8.06 1.11	U 9.33 2.118	
3	RETEST - REALIGN SIGHTS							
4	7.5	7.082	10.225	10.491	7.328	R 2.65 2.889	U 7.909 1.04	
5								
6								
7								
8								
9								
10								
AVERAGE								

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: J. R. Woods

TEST WITNESSED BY: John H. Hartley

APPROVAL BY: _____

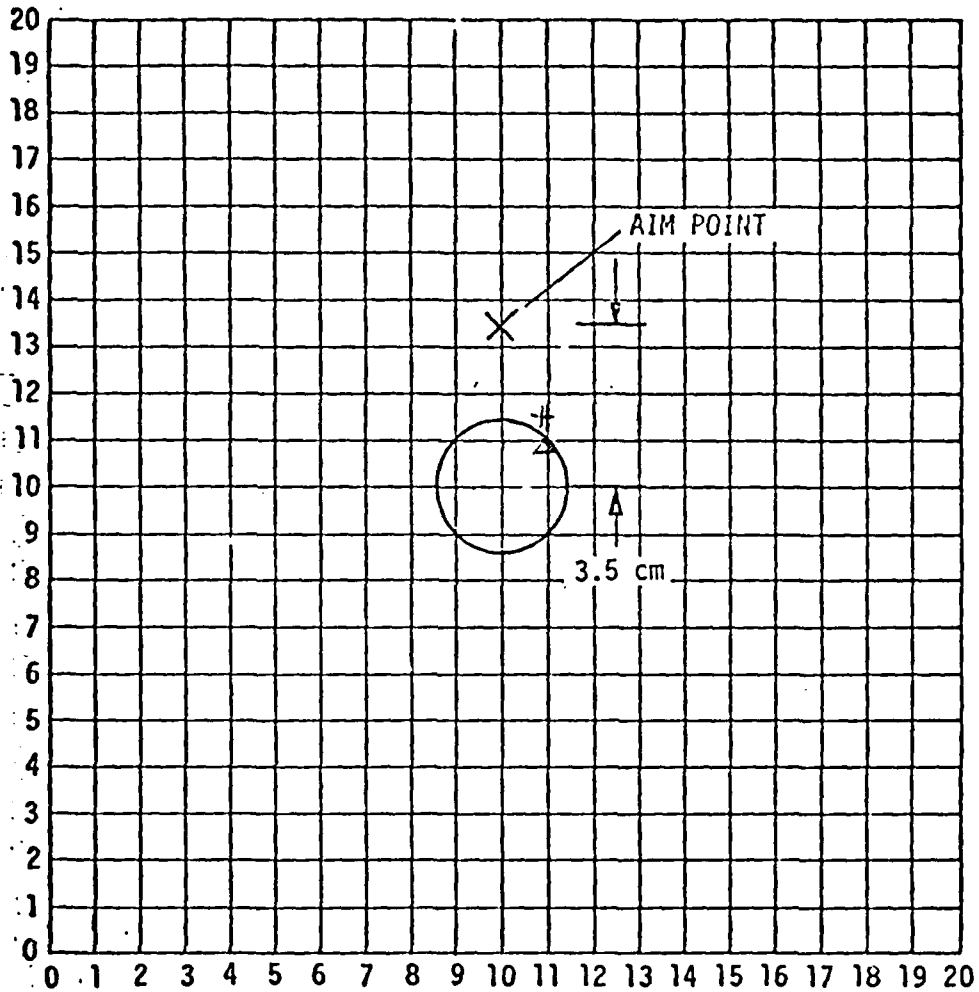
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 5
 TARGET RANGE 25 m TYPE ZEROWING DATE 2/14/77
 TEMPERATURE 60.65 HUMIDITY _____ TIME 1430
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET
 RIFLE S/N 4637118 MFG. COLT
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____
 MARKSMAN S.G.T BATT TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY OVERCAST
 TRANSMITTER MOUNTING TIME 46" ALIGNMENT TIME (IRON SIGHTS) 4'51"
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	7.949	10.959	10.29	7.810		
2	8.5	7.362	10.328	10.68	7.481	R 8.845, 8.76	H 9.08 1.47
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: F. R. W. S.

TEST WITNESSED BY: John H. Hartley

APPROVAL BY: _____

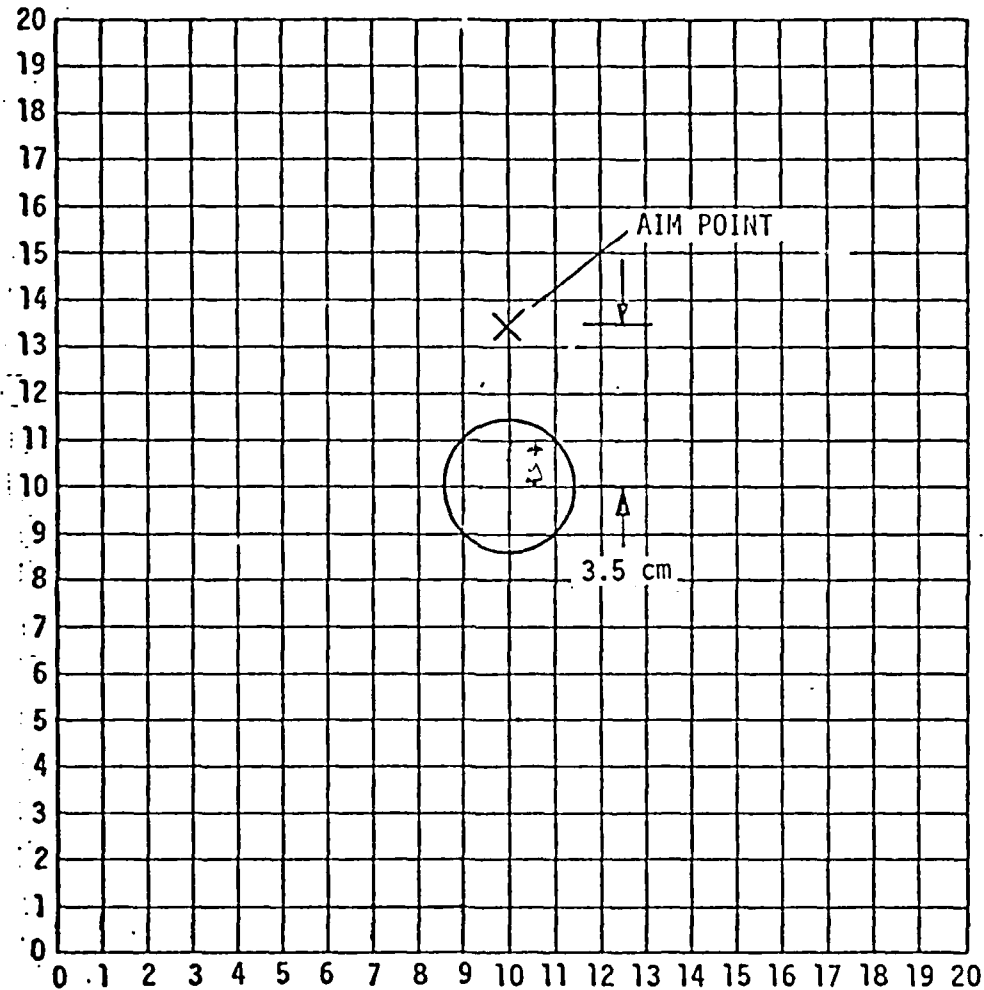
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 6
 TARGET RANGE 25M TYPE Zeroing DATE 2-14-77
 TEMPERATURE 62-55 HUMIDITY 87 TIME 14:46
 TRANSMITTER S/N 1A-00-000 DETECTOR S/N TEST DET
 RIFLE S/N 2112793 MFG. 1/1 E R
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____
 MARKSMAN SGT BATT TEST OPERATOR Woods
 ATMOSPHERIC CONDITIONS/EST VISIBILITY Overcast
 TRANSMITTER MOUNTING TIME 53" ALIGNMENT TIME (IRON SIGHTS) 4' 47"
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	7.45	10.003	11.055	7.814		
2	8.5	7.194	10.241	10.428	7.206	8.717	.552
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: F. R. [Signature]

TEST WITNESSED BY: John H. Hartley

APPROVAL BY: _____

DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 7TARGET RANGE 25 M TYPE ZEPHYRUS DATE 2-14-77TEMPERATURE 10-15 HUMIDITY 50% TIME 15:10TRANSMITTER S/N PA-77-475 DETECTOR S/N _____RIFLE S/N 3245289 MFG. G M

SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____

MARKSMAN SGT RATT TEST OPERATOR _____

ATMOSPHERIC CONDITIONS/EST VISIBILITY _____

TRANSMITTER MOUNTING TIME 45" ALIGNMENT TIME (IRON SIGHTS) 3' 15"

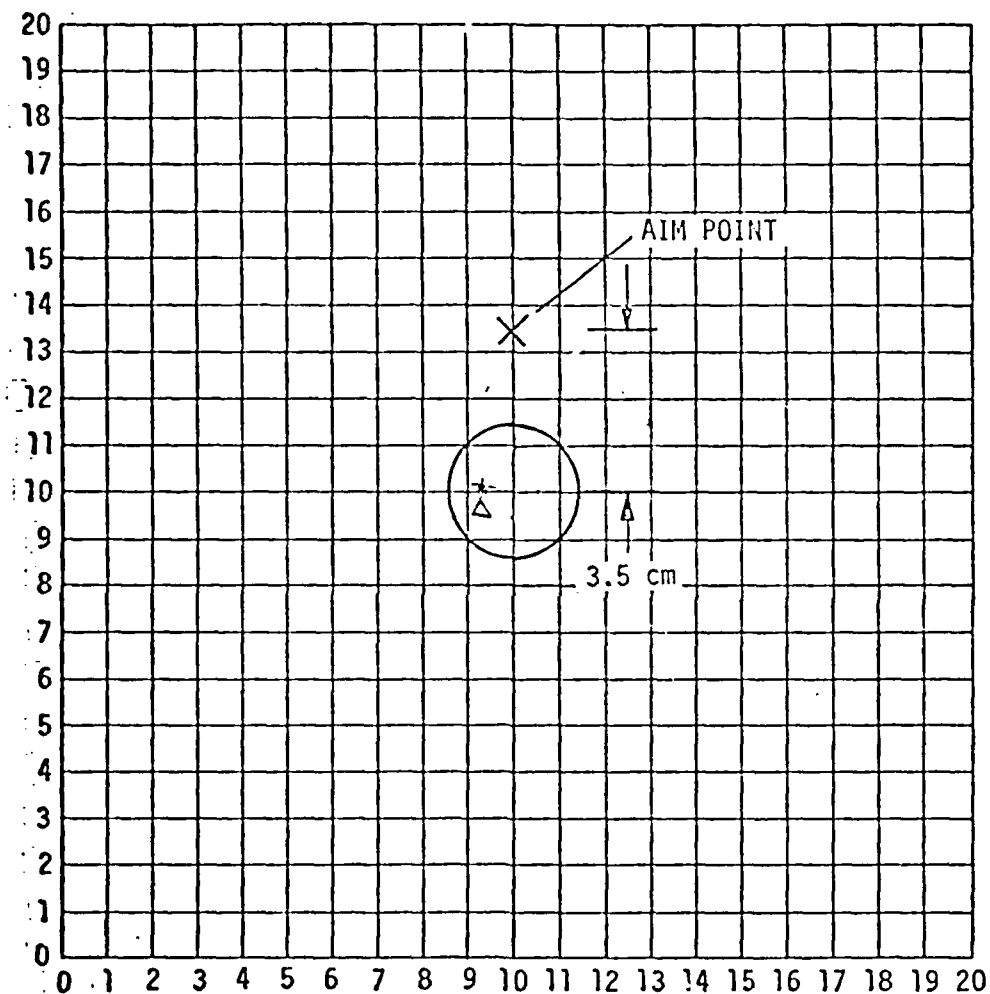
SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:

WINDAGE _____ ELEVATION _____

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	6.150	9.794	10.054	7.032	8.22	7.06
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: J R W

TEST WITNESSED BY: J. H. Smith

APPROVAL BY: _____

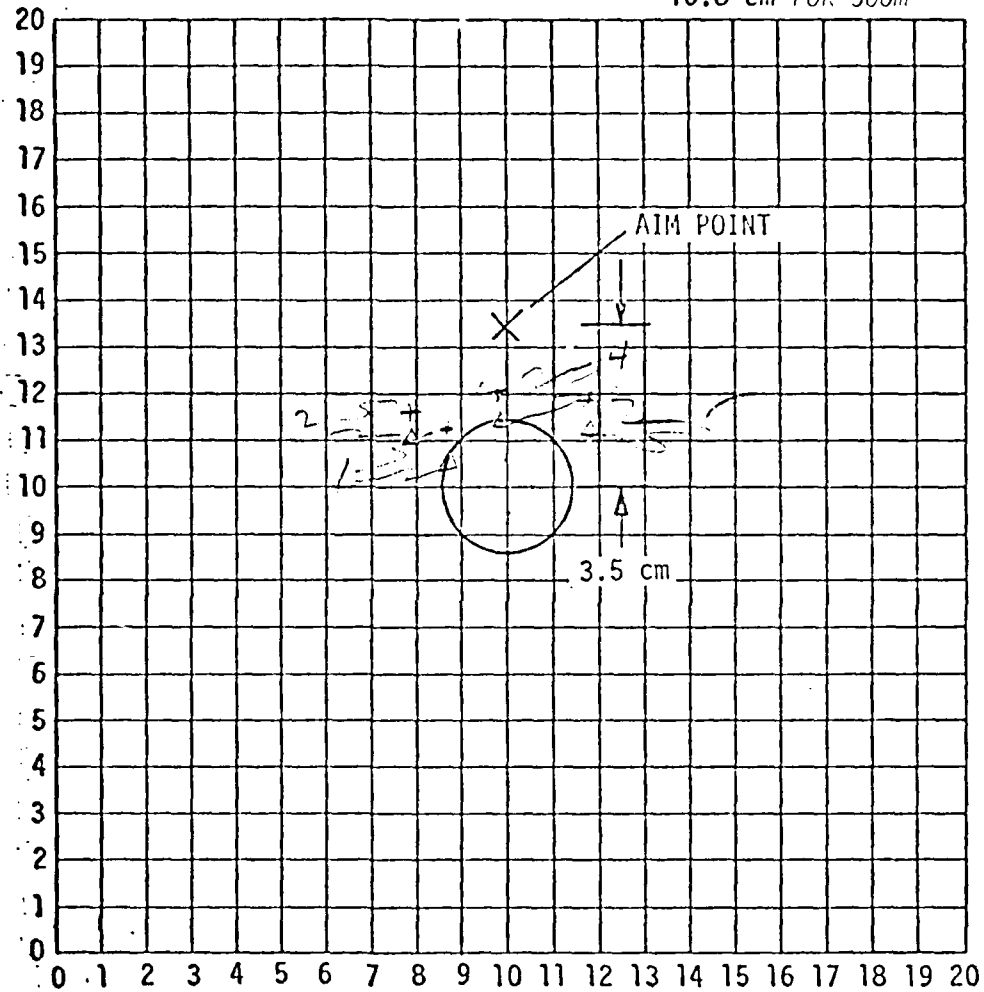
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 8
 TARGET RANGE 25 m TYPE DEMONS DATE 2/1/77
 TEMPERATURE 60 HUMIDITY _____ TIME 1520
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET
 RIFLE S/N 4630048 MFG. C.I.T
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____
 MARKSMAN SGT BATT TEST OPERATOR _____
 ATMOSPHERIC CONDITIONS/EST VISIBILITY _____
 TRANSMITTER MOUNTING TIME 50 SEC ALIGNMENT TIME (IRON SIGHTS) 2 Min
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	5.96	9.94	10.257	7.676	2.95 1.74	4.96 1.12
2		6.10	9.15	10.44	7.733	7.625 2.22	9.12 1.58
3	RETEST - REALIGN SIGHTS						
4	8.5	6.95	9.765	10.846	7.750	2.41 .228	9.298 2.027
5	7.5	8.5	9.945	10.777	7.683	3.197 1.77	9.24 1.88
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m
 8.4 cm FOR 150m
 16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: D. R. W. ---

TEST WITNESSED BY: Joseph H. Bradley

APPROVAL BY: _____

DATE: _____

ROTATION TEST

TYPE TEST ALIGNMENT TOLERANCE TEST # 9

TARGET RANGE _____ TYPE _____ DATE 2/11/77

TEMPERATURE _____ HUMIDITY _____ TIME _____

TRANSMITTER S/N _____ DETECTOR S/N _____

RIFLE S/N _____ MFG. _____

SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____

MARKSMAN _____ TEST OPERATOR W. L. L.

ATMOSPHERIC CONDITIONS/EST VISIBILITY _____

TRANSMITTER MOUNTING TIME _____ ALIGNMENT TIME (IRON SIGHTS) _____

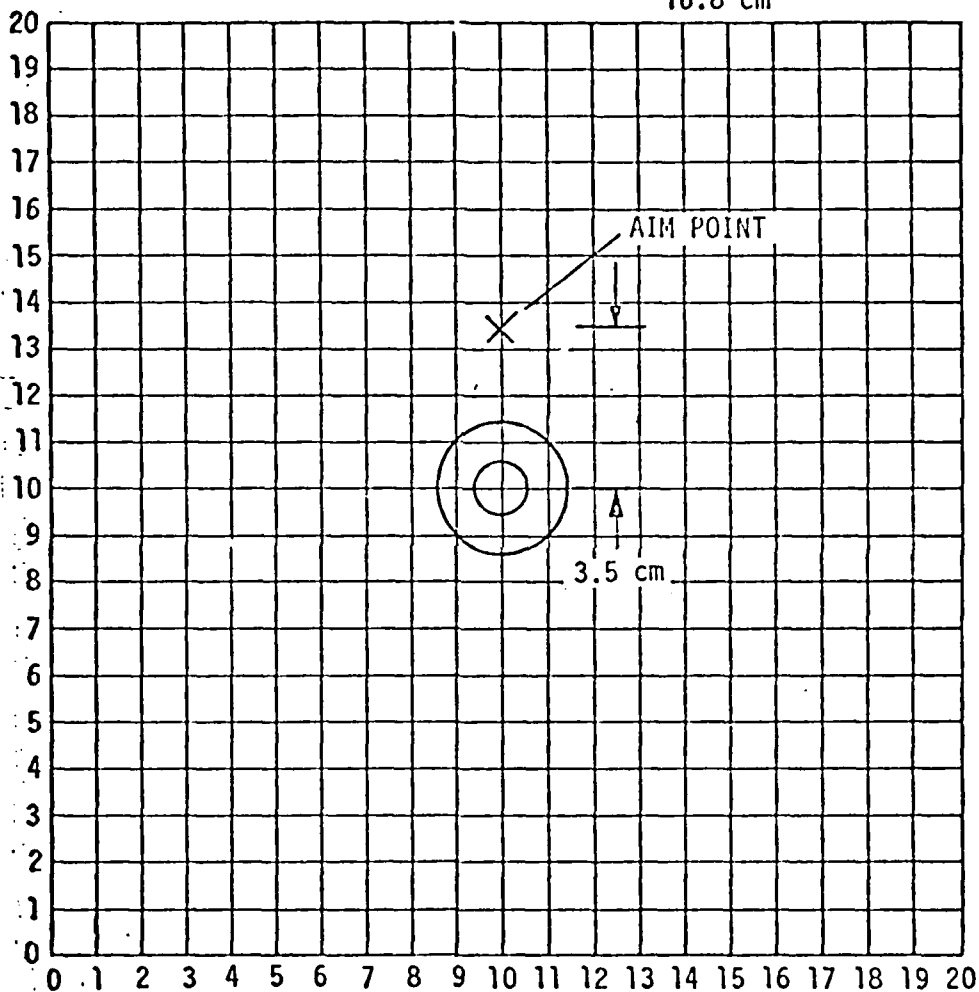
SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:

WINDAGE _____ ELEVATION _____

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1		1.53	9.197	11.991	9.083	8.115	12.537
2		1.359	9.41	11.906	8.751	7.8995	12.3285
3						.55 cm	.53 cm
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

CIRCLES OF FOLLOWING RADII: SCALE 1.4 cm
8.4 cm
16.8 cm



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: J. F. Wood

TEST WITNESSED BY: John H. Hardy

APPROVAL BY: _____

DATE: _____

2.2.2 150 AND 300 M ALIGNMENT TOLERANCE DEMONSTRATION. The laser transmitter was mounted on the Scope Sight/Laser Transmitter Adapter during the balance of the demonstration. The test procedure was as described in paragraph 2.1 of the Demonstration Test Plan and as described in the previous section of this report.

Corrections were made for the parallax discrepancy on the zeroing target/test detector arrangement prior to this test.

2.2.2.1 Test Group Results. Results of this test group are shown on test data sheets for tests 1 through 5 at 300 m, 6 through 9 at 150 m and as detailed in the following descriptions.

Test #1 (300 m) - Boresight of the rifle scope to the transmitter was accomplished indoors, prior to the field demonstration, using a 10 m lens procedure representative of the sight alignment kit.

Test #2, 3, 4, 5 (300 m) - Boresighted using the Rifle Sight/Transmitter Alignment Kit.

Test #6, 7, 8, 9 (150 m) - Boresighted using the Rifle Sight/Transmitter Alignment Kit.

TYPE TEST ALIGNMENT TOLERANCE TEST # 1
 TARGET RANGE 300 m TYPE DATE 2/15/77
 TEMPERATURE 65 HUMIDITY TIME 1140
 TRANSMITTER S/N PRO-0-V15 DETECTOR S/N TEST DET
 RIFLE S/N N/A MFG. UA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN SFC MONDAN TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR
 TRANSMITTER MOUNTING TIME ALIGNMENT TIME (IRON SIGHTS)
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:

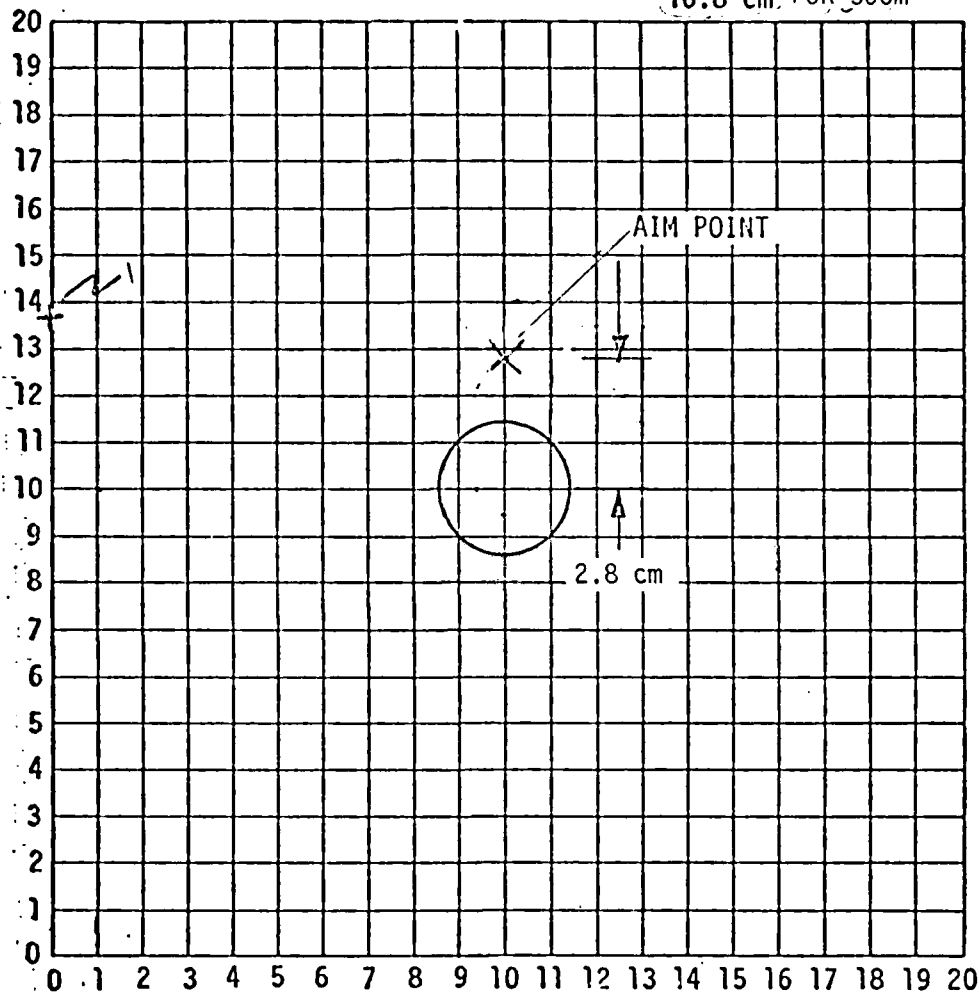
WINDAGE ELEVATION

BORE SIGHT AT PLANT WITH 10M LENS

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	<u>12" X</u> <u>8.5" Y</u>	<u>2.138</u>	<u>13.985</u>	<u>16.315</u>	<u>3.609</u>	<u>L</u> <u>9.06 10cm</u>	<u>U</u> <u>9.962 3.7cm</u>
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DR Wood

TEST WITNESSED BY: John H. Moly

APPROVAL BY: _____

DATE: _____

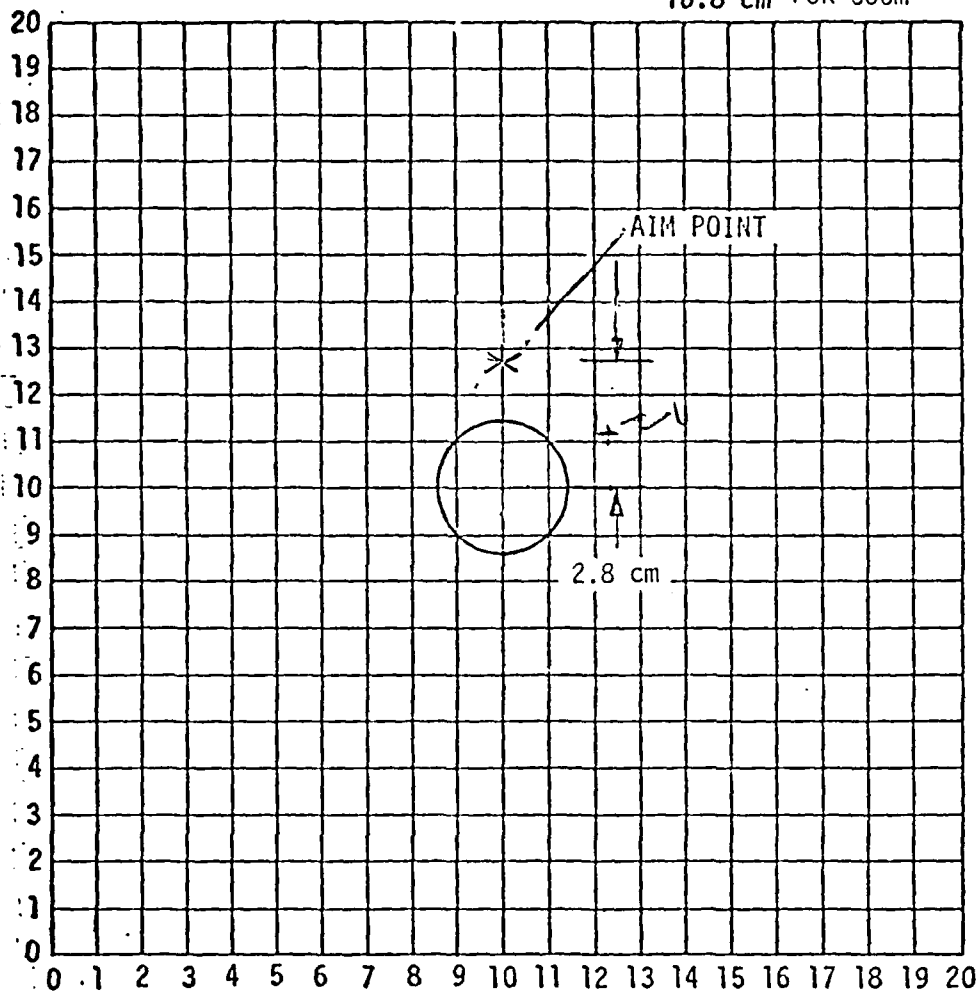
TYPE TEST ALIGNMENT TOLERANCE TEST # 2
 TARGET RANGE 300 TYPE _____ DATE 2/15/77
 TEMPERATURE 65 HUMIDITY _____ TIME 1200
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN SFC MENDON TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR
 TRANSMITTER MOUNTING TIME _____ ALIGNMENT TIME (IRON SIGHTS) _____
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____

ALIGNMENT KIT

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	<u>8.5</u>	<u>3.678</u>	<u>15.156</u>	<u>15.799</u>	<u>2.097</u>	<u>R</u> <u>7.417 2.33</u>	<u>U</u> <u>8.948 1.138</u>
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DR W. [Signature]

TEST WITNESSED BY: John H. Hartley

APPROVAL BY: _____

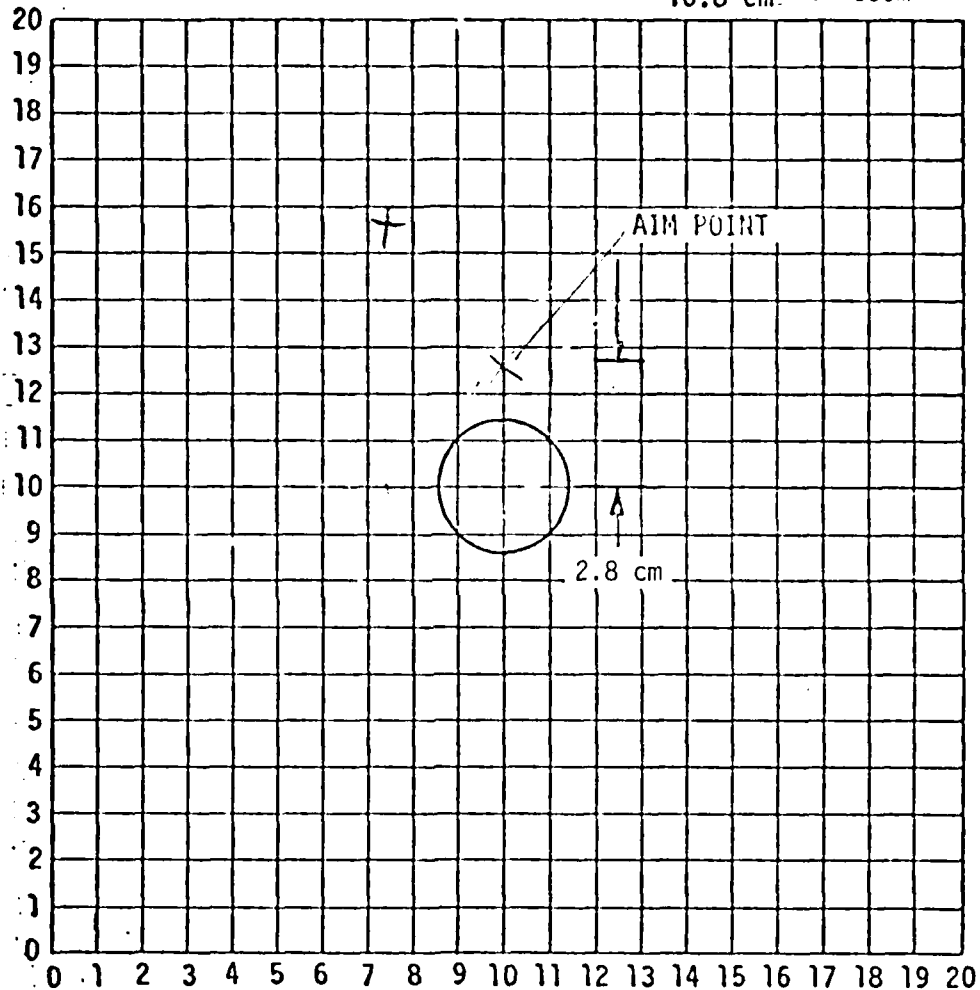
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 3
 TARGET RANGE 300 TYPE _____ DATE 2/15/77
 TEMPERATURE 65-70 HUMIDITY _____ TIME 1230
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN SGT BATT TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR
 TRANSMITTER MOUNTING TIME _____ ALIGNMENT TIME (IRON SIGHTS) _____
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	1.593	12.187	ALL WAY UP	5.747		
2	X=8.5 Y=6.0	1.192	13.830	15.255	2.912	7.506 2.5	2.207 5.61
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m
 8.4 cm FOR 150m
 16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: E. R. W. - 2

TEST WITNESSED BY: John F. Hardy

APPROVAL BY: _____

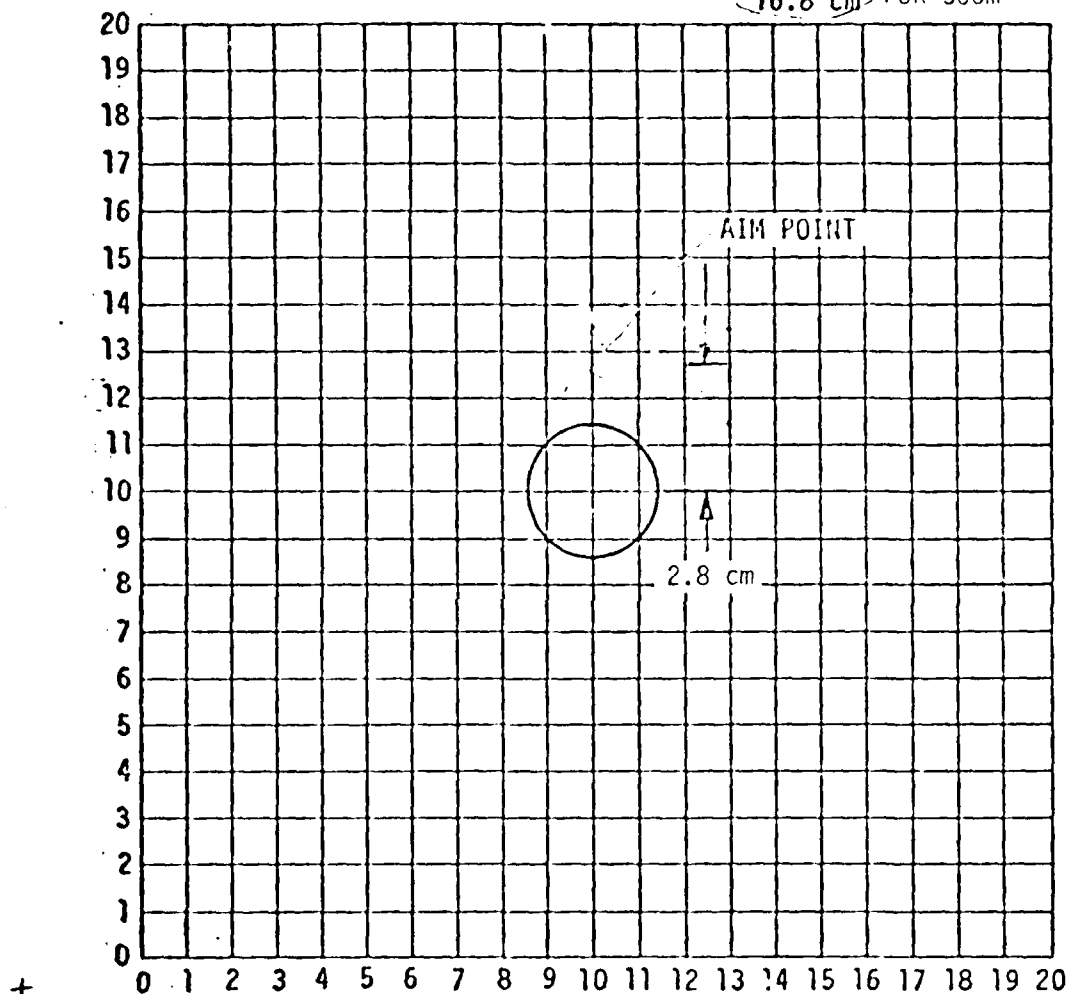
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 4
 TARGET RANGE 300 m TYPE _____ DATE 2/15/77
 TEMPERATURE 70 HUMIDITY _____ TIME 1245
 TRANSMITTER S/N PRO-ONE DETECTOR S/N TEST
 RIFLE S/N NA M.G. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ☒
 MARKSMAN PHIL SPRINKLE TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR
 TRANSMITTER MOUNTING TIME _____ ALIGNMENT TIME (IRON SIGHTS) _____
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	85			11.54	3.58		
2	15.05 y=10.0	16.22	5.51	11.49	0.0	3.56	2.58
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: D.R. W.

TEST WITNESSED BY: J. H. Hardy

APPROVAL BY: _____

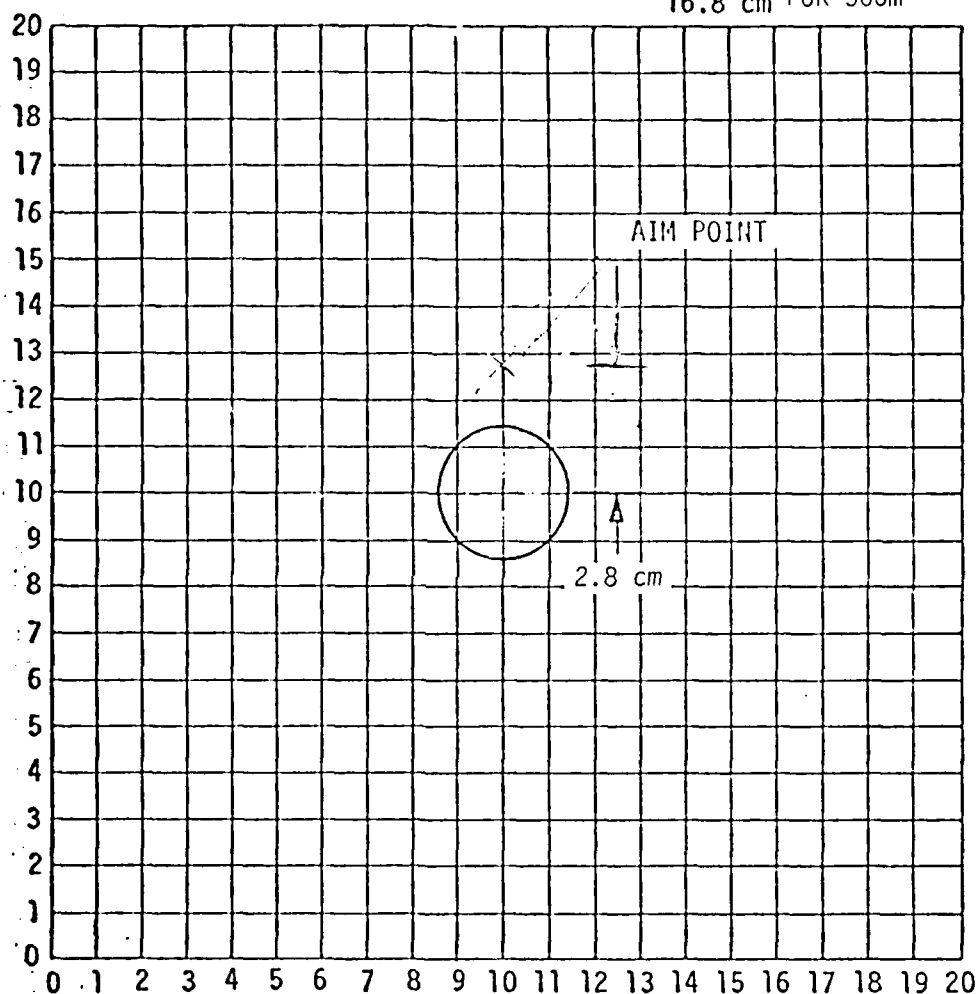
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 5
 TARGET RANGE 300m TYPE DATE 2/15/77
 TEMPERATURE 70 HUMIDITY TIME
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET
 RIFLE S/N N/A MFG. N/A
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN TACK HARTLEY TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR SUNNY
 TRANSMITTER MOUNTING TIME ALIGNMENT TIME (IRON SIGHTS)
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE ELEVATION

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5				ALSTHE 1.21		
2	x=8.5 y=13.5	12.182	13.716	14.31	0.31	2.949 1.4	2.314 14.5
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: D.R. W.

TEST WITNESSED BY: John H. Hartley

APPROVAL BY: _____

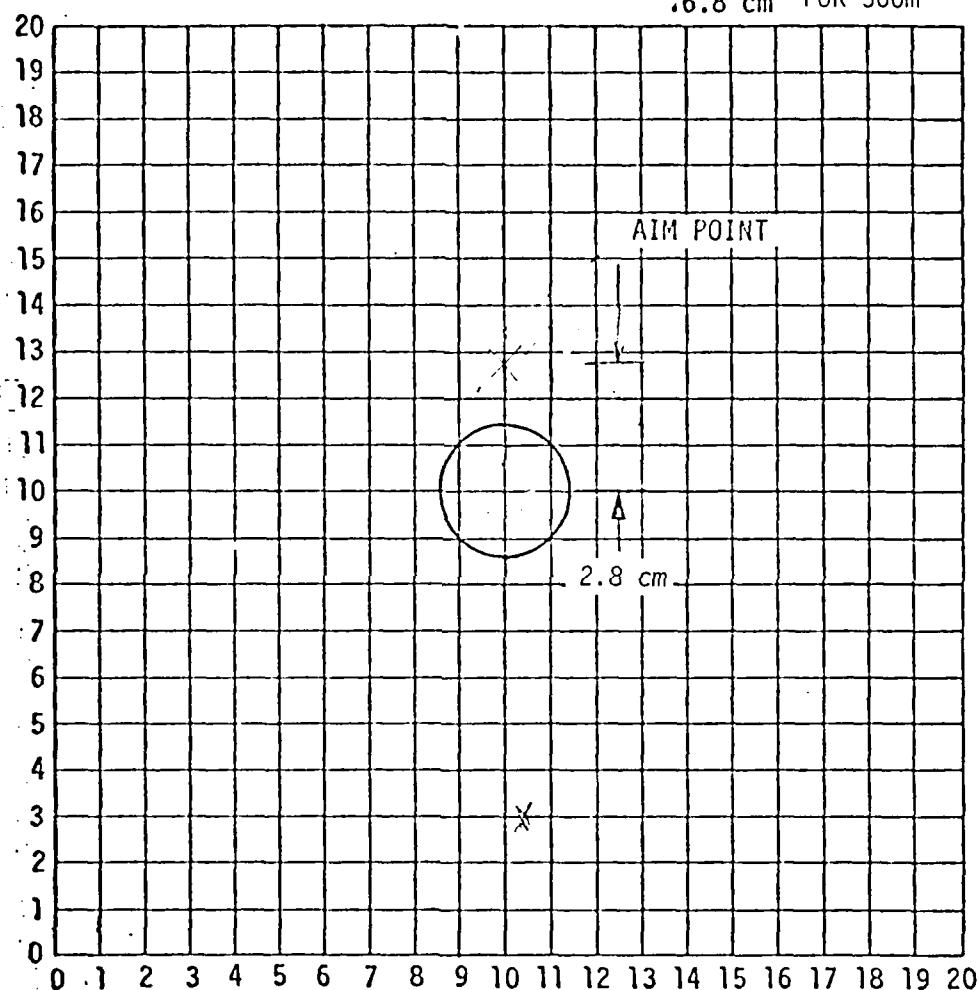
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 6
 TARGET RANGE 150 m TYPE _____ DATE 2/15/77
 TEMPERATURE 70 HUMIDITY _____ TIME 1330
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN JACK HARTLEY TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR SUNNY
 TRANSMITTER MOUNTING TIME _____ ALIGNMENT TIME (IRON SIGHTS) _____
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	7.5	5.884	11.440	9.703	1.810	R 2.662 .41	D 5.756 4.97
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m
 8.4 cm FOR 150m
 16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DR L. Wood

TEST WITNESSED BY: John A. Hartley

APPROVAL BY: _____

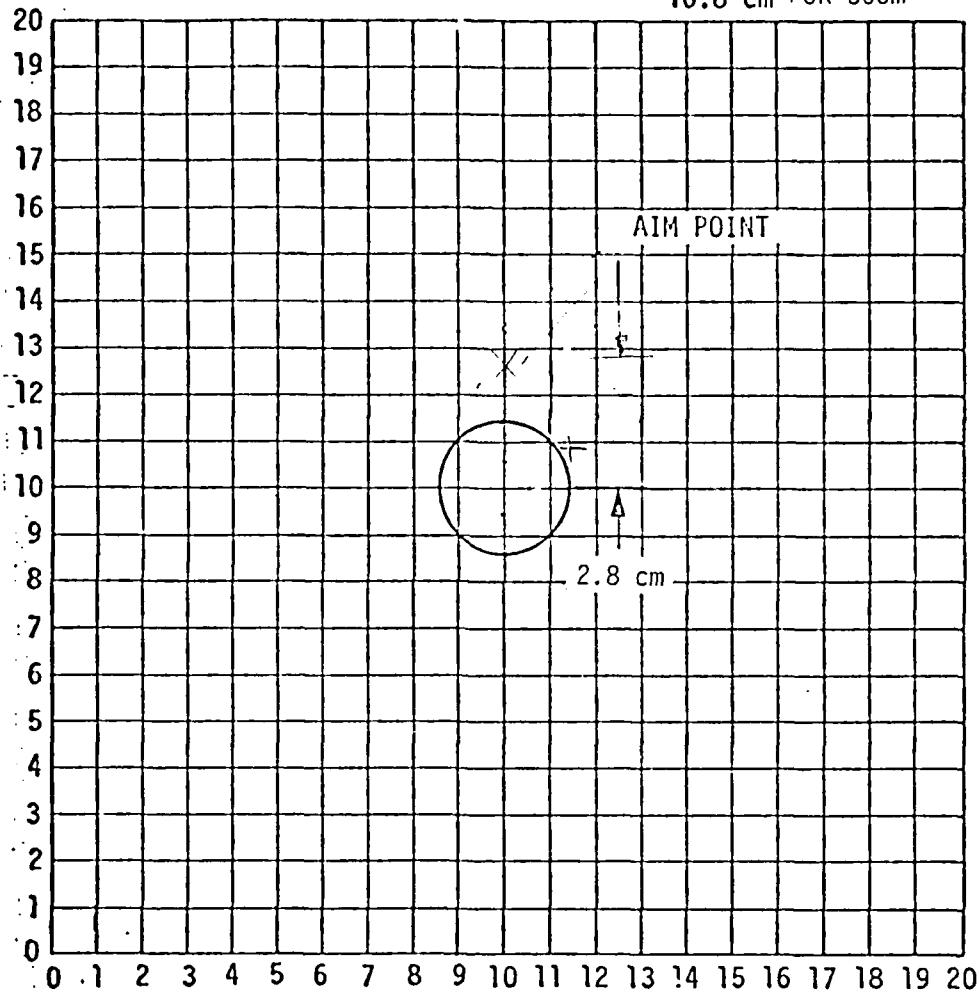
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 7
 TARGET RANGE 150 m TYPE _____ DATE 2/15/77
 TEMPERATURE 70 HUMIDITY _____ TIME 1345
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN SFC MONDUN TEST OPERATOR WIGGS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR - SUNNY
 TRANSMITTER MOUNTING TIME _____ ALIGNMENT TIME (IRON SIGHTS) _____
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	5.421	12.714	12.753	4.999	R 7.067" 1.44	U 7.876" .955
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DR 10-2

TEST WITNESSED BY: John H. Hartley

APPROVAL BY: _____

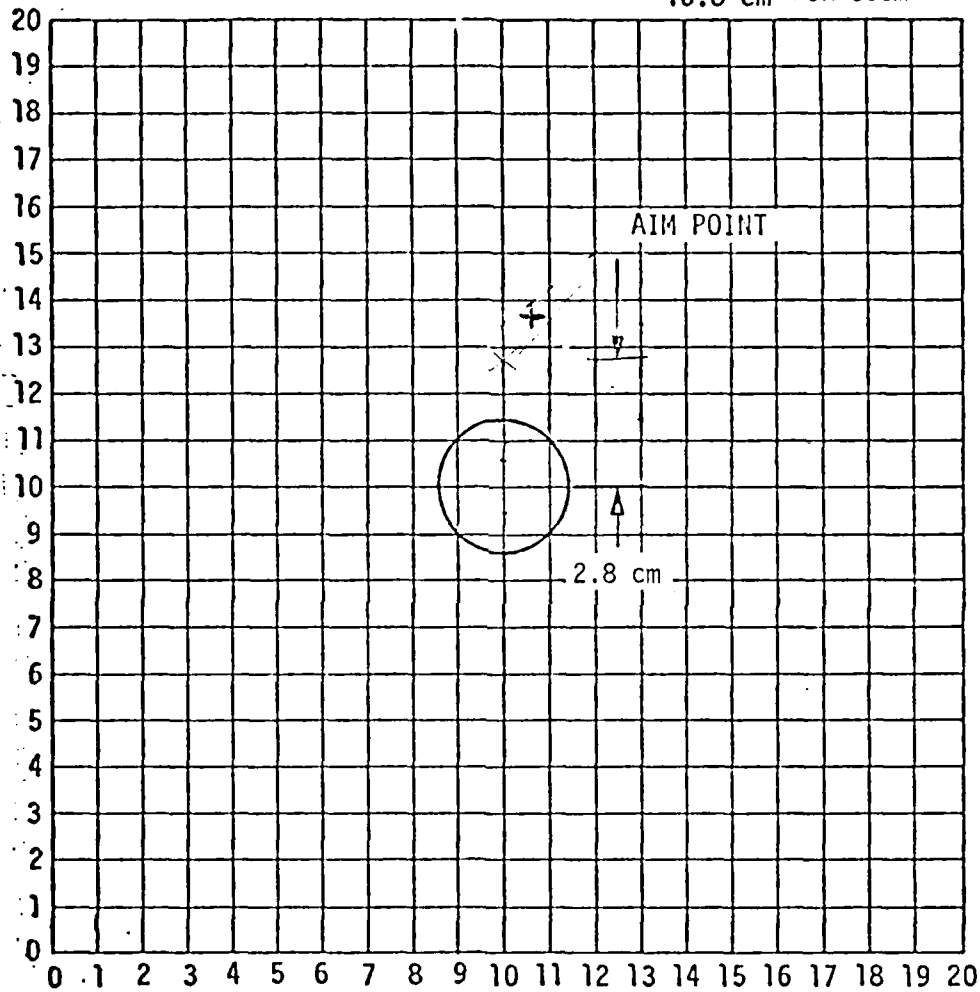
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 8
 TARGET RANGE 150 m TYPE _____ DATE 2/15/77
 TEMPERATURE 70 HUMIDITY _____ TIME 1350
 TRANSMITTER S/N PRO-TIVE DETECTOR S/N TEST DET
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN SGT BATT TEST OPERATOR LOCCDS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY _____
 TRANSMITTER MOUNTING TIME _____ ALIGNMENT TIME (IRON SIGHTS) _____
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	2.5	5.179	12.414	13.635	6.233	R 8.796 .753	U 9.934 3.64
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m
8.4 cm FOR 150m
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

P3443

Test Record Chart

TEST CONDUCTED BY: D. H. W. - 2

TEST WITNESSED BY: J. H. Hartley

APPROVAL BY: _____

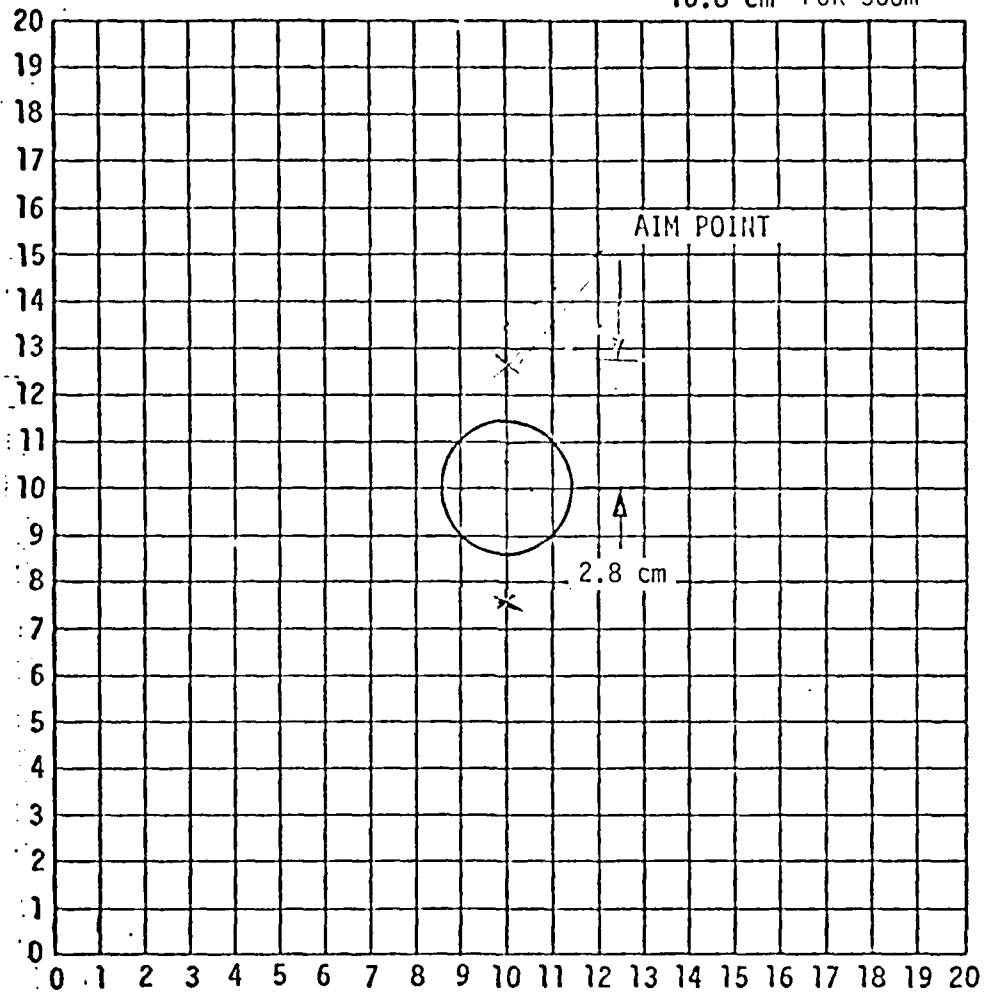
DATE: _____

TYPE TEST ALIGNMENT TOLERANCE TEST # 9
 TARGET RANGE 150m TYPE _____ DATE 2/15/77
 TEMPERATURE 70 HUMIDITY _____ TIME _____
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN PHIL SPRINKLE TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR - SUNNY
 TRANSMITTER MOUNTING TIME _____ ALIGNMENT TIME (IRON SIGHTS) _____
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	5.510	11.470	7.94	2.128	8.495.013	6.038 2.54
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m
 8.4 cm FOR 150m
 16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DR W...

TEST WITNESSED BY: Jack M. Bentley

APPROVAL BY: _____

DATE: _____

2.3 EYE SAFETY TEST

A representative of Aberdeen Proving Ground conducted eye safety measurements on the MAGLAD breadboard transmitter following a preliminary demonstration of the Scaled Record Fire Range. Output power of the transmitter was found to be approximately 100 MW, down by nearly a factor of four from the 375 MW expected. This power reduction was verified using contractor equipment.

Additional demonstrations were postponed until the laser diode could be replaced in the transmitter and performance verified.

2.4 EFFECTIVE SIMULATION OF FIRING WITH SERVICE AMMUNITION AT MINIMUM, MAXIMUM AND INTERMEDIATE RANGES

The laser transmitter power was measured each day and remained constant at approximately 409 MW during the balance of the Effective Simulation Demonstration. Detector sensitivity was set and measured to be nominally $15.3 \mu\text{W}/\text{cm}^2$ for all ranges except 25 m where $8.5 \mu\text{W}/\text{cm}^2$ was selected.

The test setup was as described in paragraph 2.2 of the test plan. However, the test procedure was modified, by the NTEC MAGLAD project manager, to perform target profiling rather than fire at selected aim points per the Demonstration Test Plan.

2.4.1 EFFECTIVE SIMULATION DEMONSTRATION. All detectors except the head were masked off for boresighting. Boresighting was accomplished by aligning the transmitter sighting scope crosshairs on the head detector and scanning the test target to determine the beam centroid. The test target was then positioned with the head detector at the beam centroid and the scope crosshairs adjusted to center on the detector, resulting in boresight at the test range.

Remaining detectors were unmasked and the transmitter scanned upward until detection ceased, then downward until detection resumed; thereby defining the target edge. The aim coordinate is then read on the test target grid scale and plotted as an "*" on E-Target and F-Target Test Record Charts. The transmitter was subsequently aimed at consecutive rows on the test target grid and scanned left/right to determine target edge profile.

Following profiling, aimpoints were selected on the target grid and single shots were fired to verify the target edge resulting from the above procedure. "Hits" are plotted on the Test Record Chart as an "H" and "miss" as an "M". Detector locations are plotted as a "•". The test form, on the reverse side of E-Target and F-Target Test Record Charts, records data pertinent to that test.

2.4.1.1 Test Group Results (E-Target, 300 to 200 m). Results of this test group are shown on test data sheets for tests 1 through 3 at 300 m, 4 through 6 at 250 m and 7 through 10 at 200 m and as detailed in the following descriptions.

Test #1 (300 m) - Full visibility.

Test #2 (300 m) - Reduced visibility by 8 dB, noted boresight error due to ND filter wedge beam steering.

Test #3 (300 m) - Reduced visibility by 12 dB (ref. only, not part of acceptance criteria), noted boresight error.

Test #4 (250 m) - Full visibility.

Test #5 (250 m) - Reduced visibility by 6.7 dB.

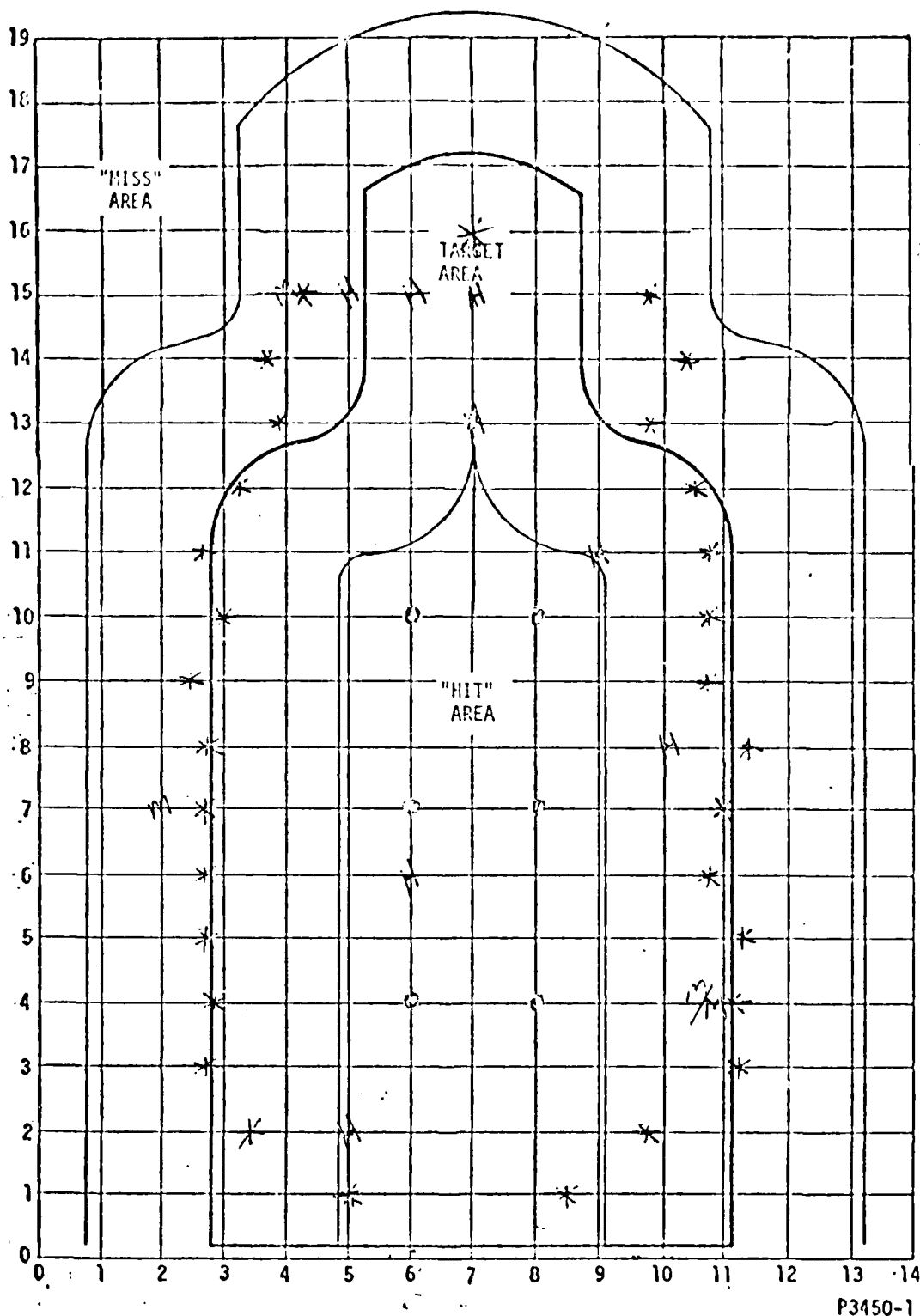
Test #6 (250 m) - Reduced visibility by 10.5 dB (ref. only, not part of acceptance criteria).

Test #7 (200 m) - Full visibility, unacceptable results.

Test #8 (200 m) - Full visibility, repositioned detector on test target.

Test #9 (200 m) - Reduced visibility by 5.3 dB.

Test #10 (200 m) - Reduced visibility by 8 dB (ref. only, not part of acceptance criteria).



E-Target Test Record Chart, 300 m (Sheet 1 of 4)

TEST RESULTS

ACCEPTABLE

NOT ACCEPTABLE

TEST CONDUCTED BY: EN Wood

TEST WITNESSED BY: Julia Hartley

APPROVAL BY:

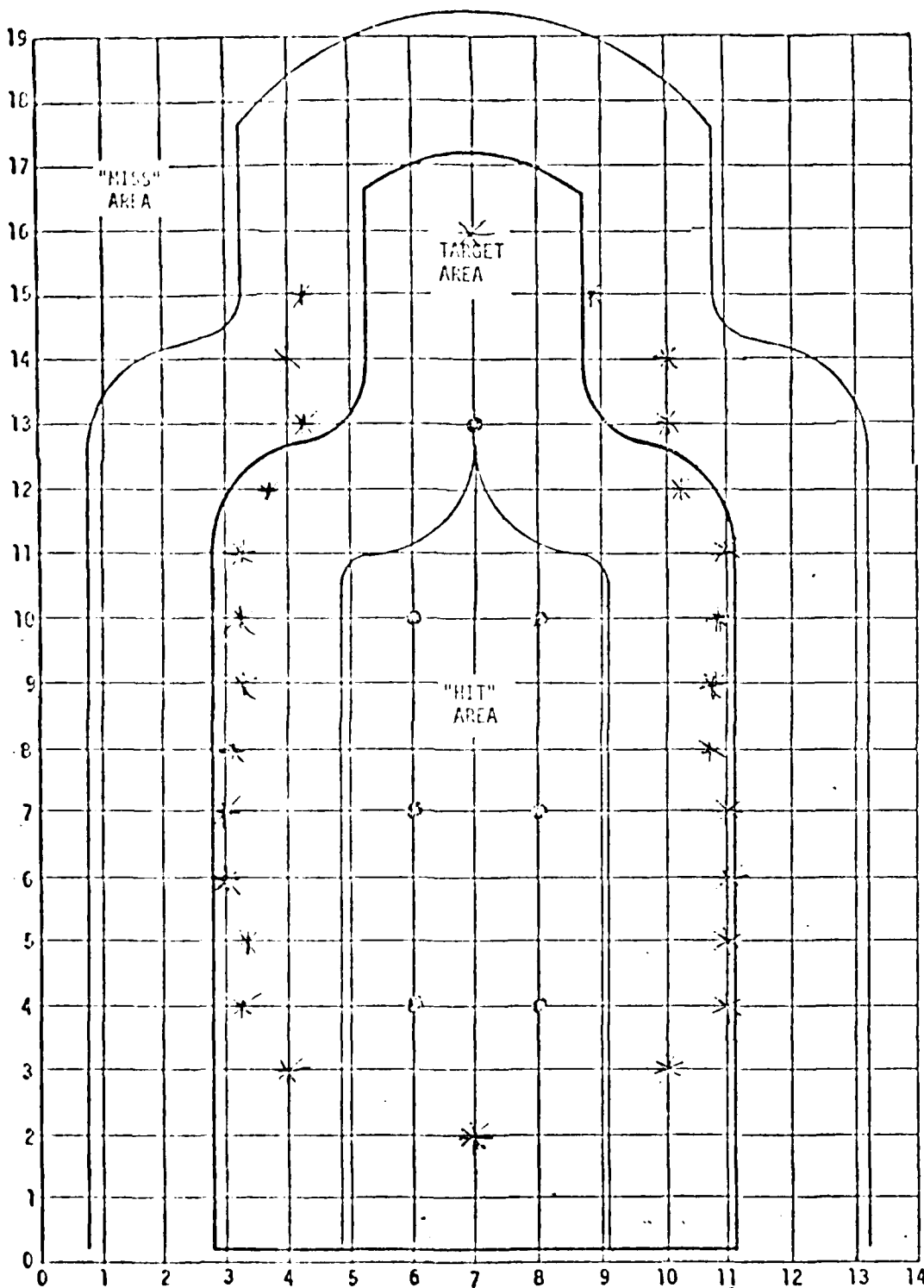
TYPE TEST 20 ROUND GROUP SHOT TEST # 1
 TARGET RANGE 300 TYPE 2 DATE 2/22/77
 TIME 10:00 S/E ~ DETECTOR 3/2
 RIFLE S/N N/A MFG. N/A
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER 6
 MAINTENANCE ~ TEST OPERATOR 10000
 ATMOSPHERIC CONDITIONS/EXT VISIBILITY clear - 2000 yds 70°
 TRANSMITTER MOUNTING TIME N/A ALIGNMENT TIME (IRON SIGHTS) N/A
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE N/A ELEVATION N/A
 SIMULATED VISIBILITY RANGE N/A
 ATTENUATOR (ND) FILTERS USED NONE
 LOCATION COORDINATE OF AIM POINT (PLOT ON REVERSE SIDE) ~
 AIM POINT FOR HITS ~ OR MISSES ~

20 ROUND GROUP SHOT

	20 ROUND GROUP SHOT =	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = ~
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = ~

Test Form



BARE LIGHT IS 1 1/2 DIV HIGH

P3450-1

E-Target Test Record Chart, 300 m (Sheet 1 of 4)

TEST RESULTS

ACCEPTABLE _____

NOT ACCEPTABLE _____

TEST CONDUCTED BY: G. J. Woots

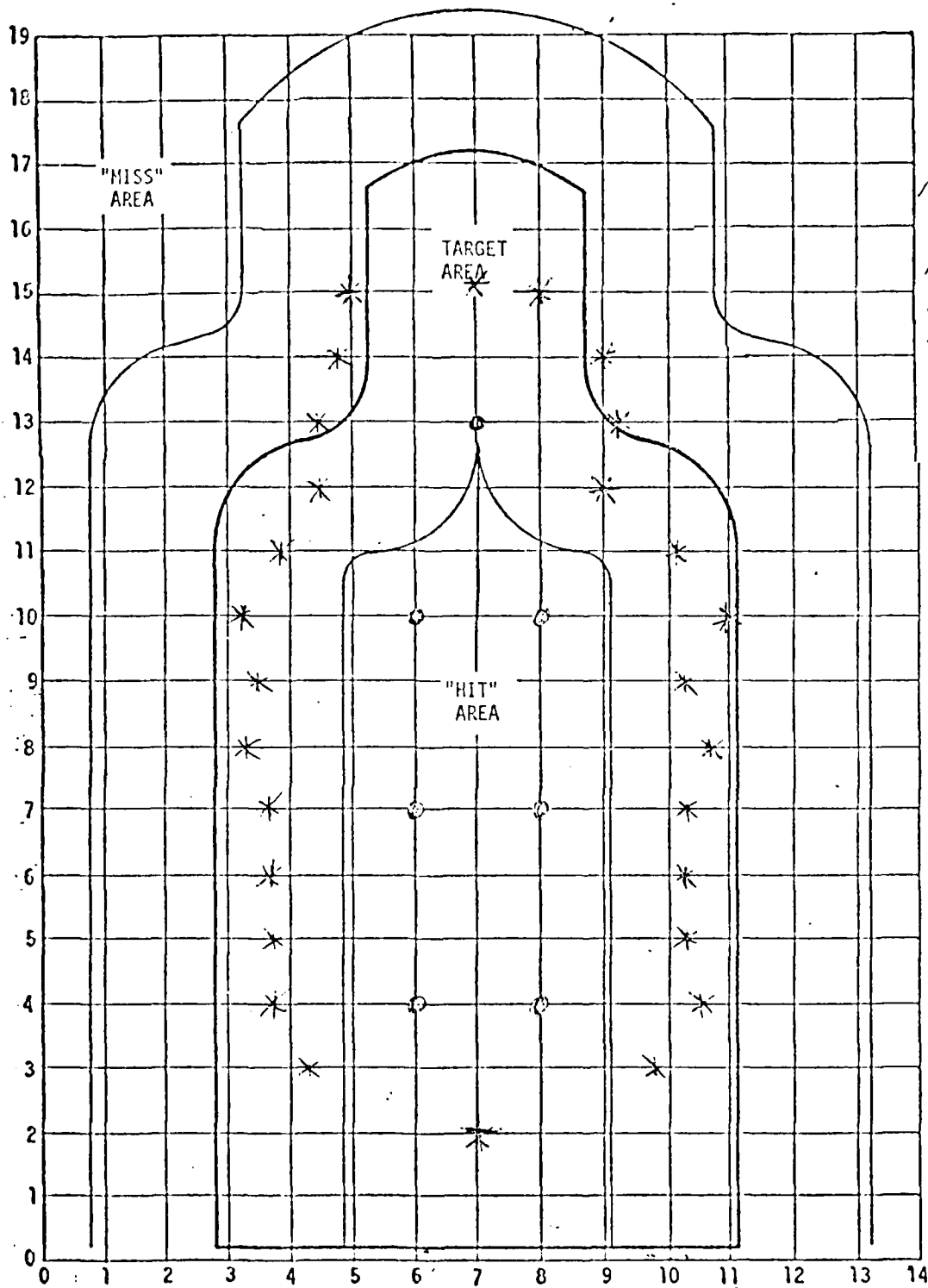
TEST WITNESSED BY: J. H. G. Smith

APPROVAL BY: _____

TYPE TEST REDUCED VISIBILITY TEST # 2
 TARGET RANGE 300 TYPE E DATE 2/22/57
 TEMPERATURE S/N _____ DETECTOR S/N _____
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____
 MARKSMAN _____ TEST OPERATOR 600025
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR Sunny 70°
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE NA ELEVATION NA
 SIMULATED VISIBILITY RANGE _____
 ATTENUATOR (ND) FILTERS USED 0.75
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____



#3

2/24/

REDUCED
VISIBL

ND = 1.7

H + .77

* No. 11

BORE SIGHT 1/4 DIV HIGH

P3450-1

E-Target Test Record Chart, 300 m (Sheet 1 of 4)

TEST RESULTS

ACCEPTABLE _____

NOT ACCEPTABLE _____

TEST CONDUCTED BY: Lion R. Woot

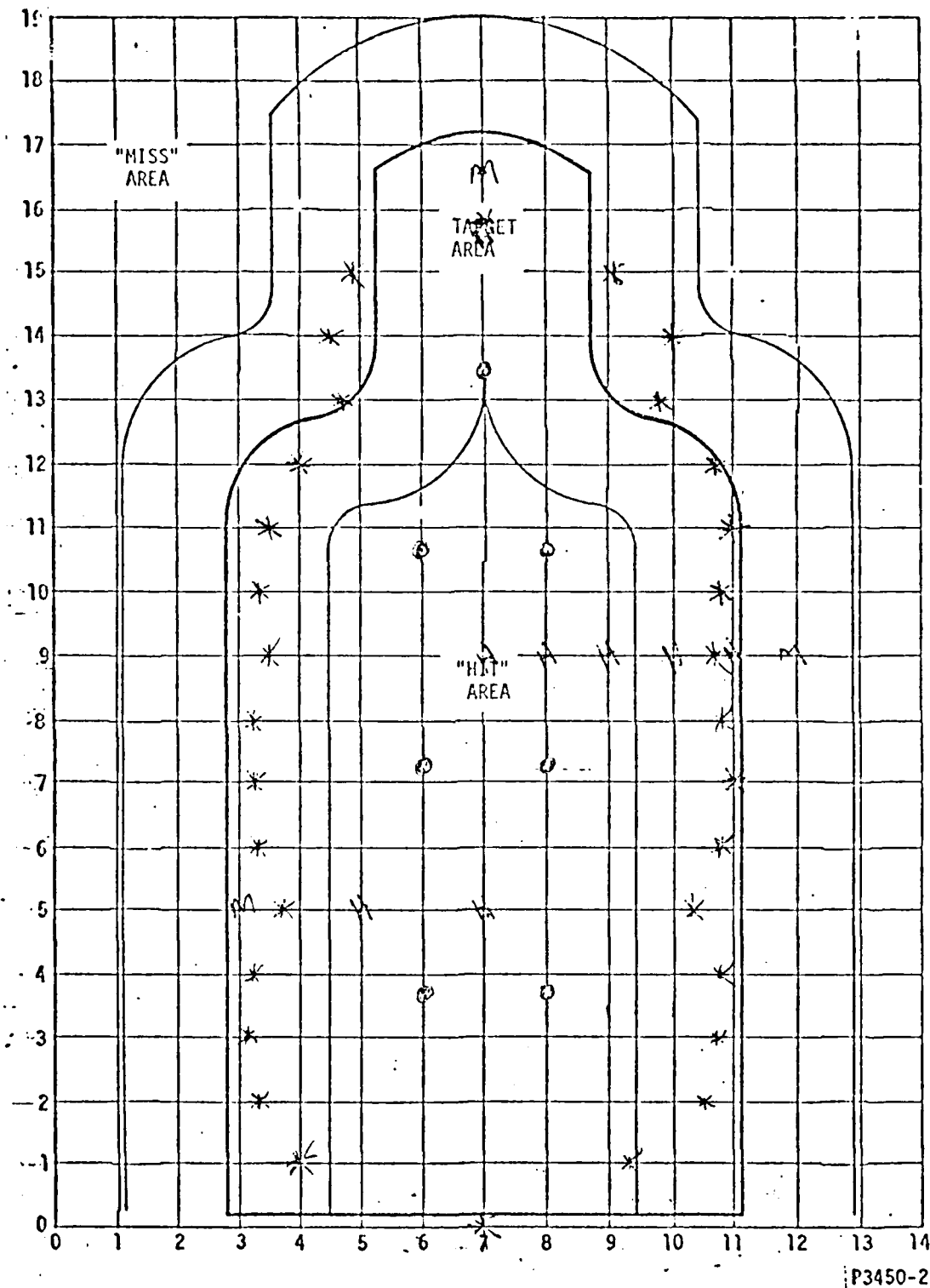
TEST WITNESSED BY: Miller

APPROVAL BY: _____

TYPE TEST REDUCED VISIBILITY TEST # 3
 TARGET RANGE _____ TYPE _____ DATE 2/2/77
 TEMPERATURE S/N _____ DETECTOR S/N _____
 RIFLE S/N N/A MFG. N/A
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN _____ TEST OPERATOR JOHNS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR SKY 70°
 TRANSMITTER MOUNTING TIME N/A ALIGNMENT TIME (IRON SIGHTS) N/A
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE N/A ELEVATION N/A
 SIMULATED VISIBILITY RANGE _____
 ATTENUATOR (ND) FILTERS USED 4 PLUS 0.29
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____



E-Target Test Record Chart, 250 m (Sheet 2 of 4)

TEST RESULTS

TEST CONDUCTED BY: DR Woods

ACCEPTABLE _____
NOT ACCEPTABLE _____

TEST WITNESSED BY: Philip E. Sparker

APPROVAL BY: _____

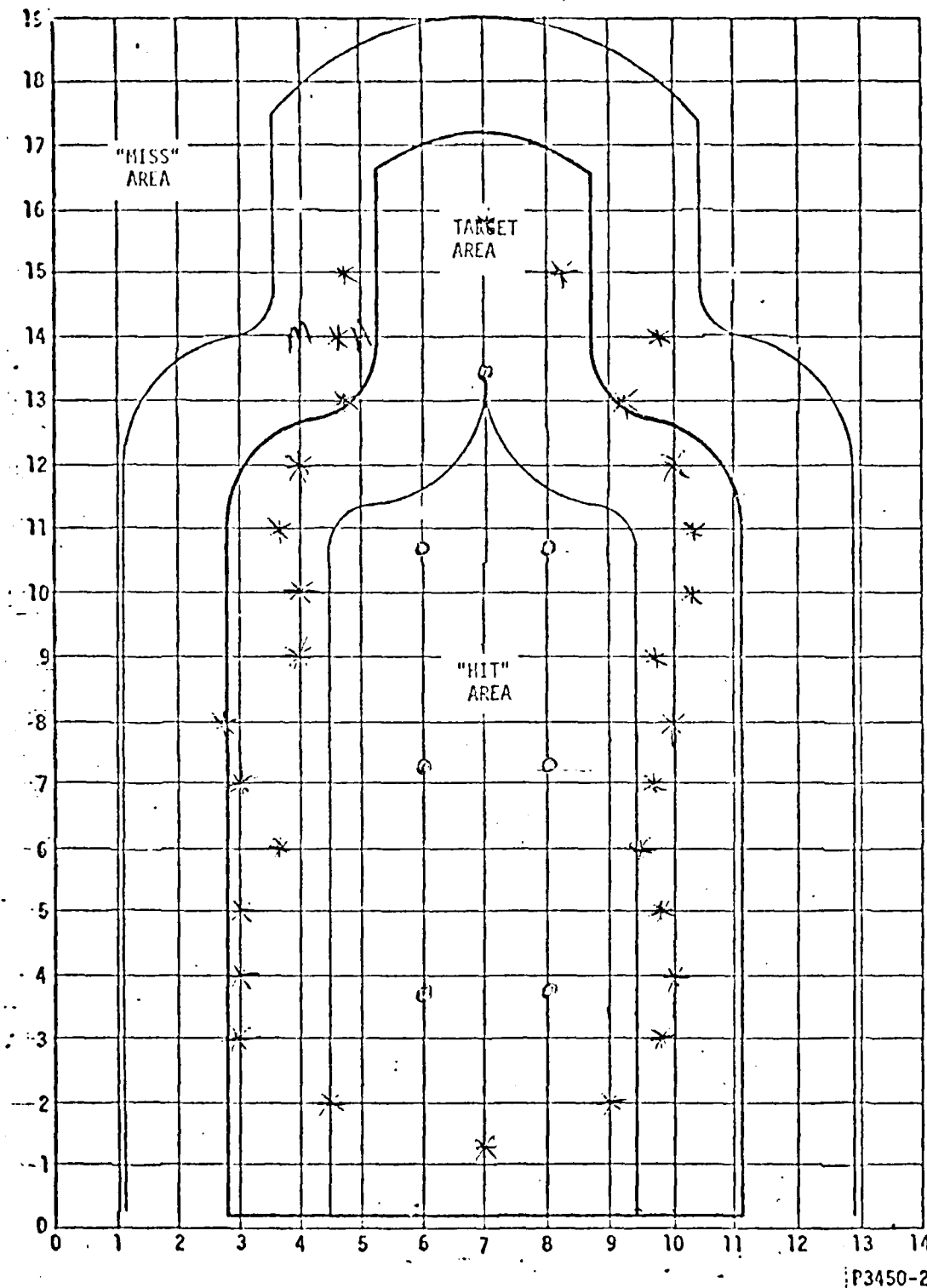
TYPE TEST FULL SCALE EFFECTIVE SIMULATION TEST # 4
 TARGET RANGE 750 TYPE E DATE 2/22/77
~~TRANSMITTER USED~~ SEN ~~TEMPERATURE S/N~~ DETECTOR S/N _____
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN _____ TEST OPERATOR LORENZ
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR Sunny 70°
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE NA ELEVATION NA
 SIMULATED VISIBILITY RANGE NA
 ATTENUATOR (ND) FILTERS USED NA
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

RIFLE SCOPE PRESIGHTED TO RANGE

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____

ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____



E-Target Test Record Chart, 250 m (Sheet 2 of 4)

TEST RESULTS

ACCEPTABLE _____
NOT ACCEPTABLE _____

TEST CONDUCTED BY: Don R. Woods

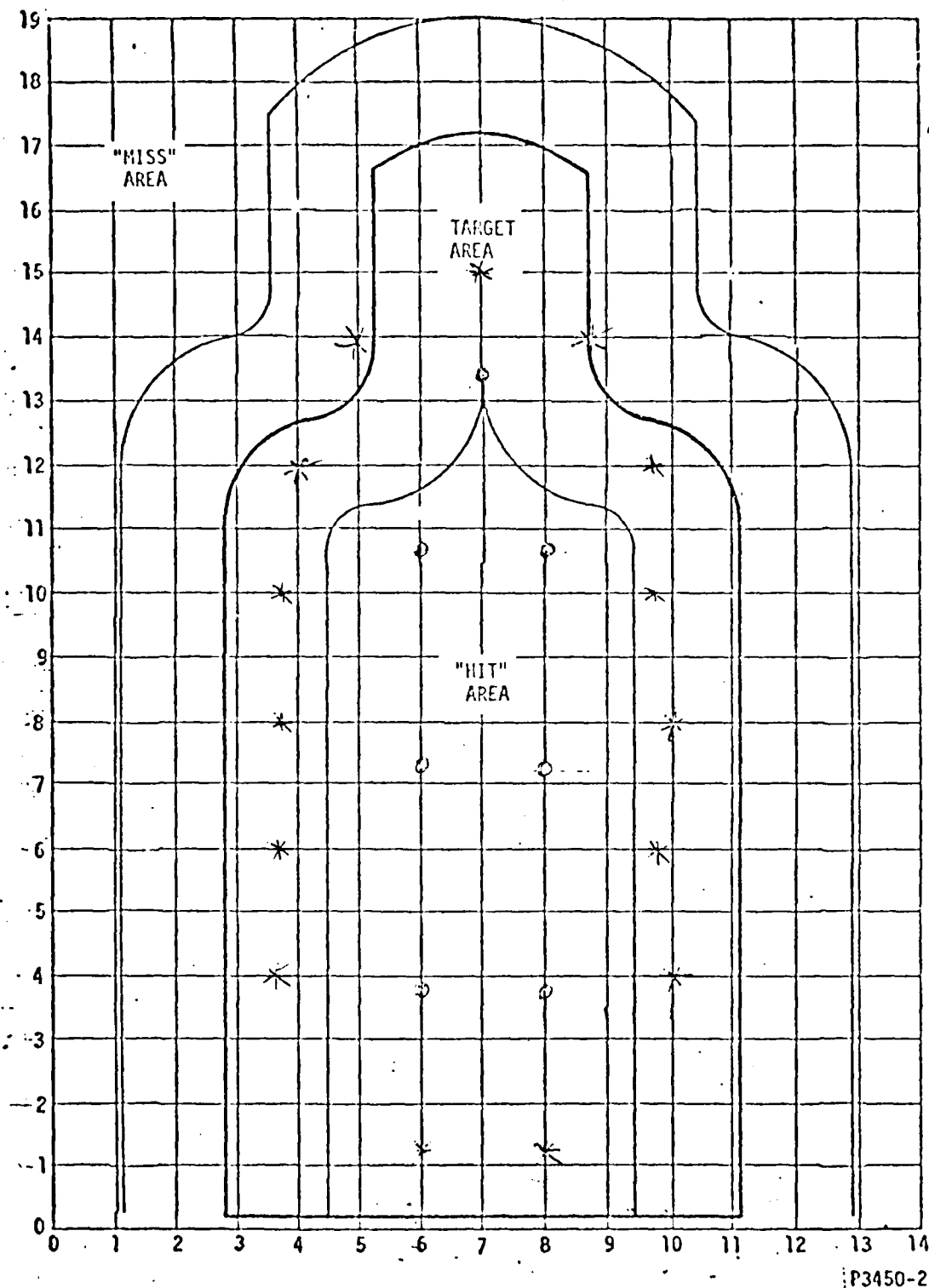
TEST WITNESSED BY: John H. Hardy

APPROVAL BY: _____

TYPE TEST FULL SCALE Simulation TEST # 5
 TARGET RANGE 250 TYPE E DATE 4/24/77
 TEMPERATURE S/N _____ DETECTOR S/N _____
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER 2
 MARKSMAN _____ TEST OPERATOR WOODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY clear sky 70°
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE NA ELEVATION NA
 SIMULATED VISIBILITY RANGE _____
 ATTENUATOR (ND) FILTERS USED .52 + .15
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____



TEST #16
2/22/77
REDUCED
VISIBILITY
ND 1.05

E-Target Test Record Chart, 250 m (Sheet 2 of 4)

TEST RESULTS

TEST CONDUCTED BY:

ACCEPTABLE _____
NOT ACCEPTABLE _____

TEST WITNESSED BY:

57 APPROVAL BY:

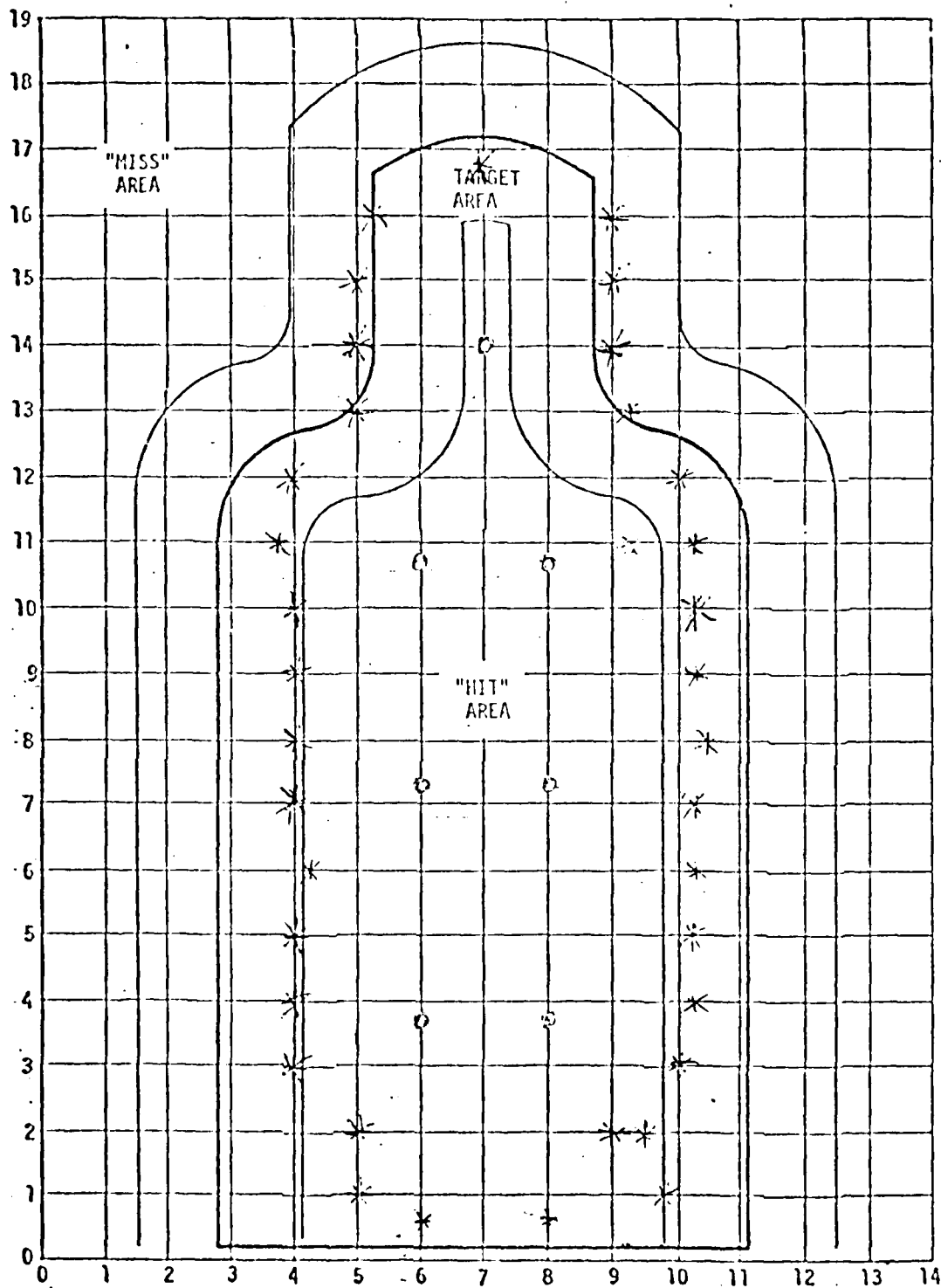
Jack S. Hartley

TYPE TEST REDUCED VISIBILITY TEST # 6
 TARGET RANGE 250 TYPE E DATE 2/22/77
 TEMPERATURE S/N _____ DETECTOR S/N _____
 RIFLE S/N _____ MFG. _____
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____
 MARKSMAN _____ TEST OPERATOR _____
 ATMOSPHERIC CONDITIONS/EST VISIBILITY _____
 TRANSMITTER MOUNTING TIME _____ ALIGNMENT TIME (IRON SIGHTS) _____
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____
 SIMULATED VISIBILITY RANGE _____
 ATTENUATOR (ND) FILTERS USED .52 + .4 + .15 = 1.07
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPPOPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____

Test Form



TEST
7
2/22/75
A: PROFILE

IP3450-3

E-Target Test Record Chart, 200 m (Sheet 3 of 4)

TEST RESULTS

TEST CONDUCTED BY: Don K. [Signature]TEST WITNESSED BY: Joe L. [Signature]

ACCEPTABLE _____

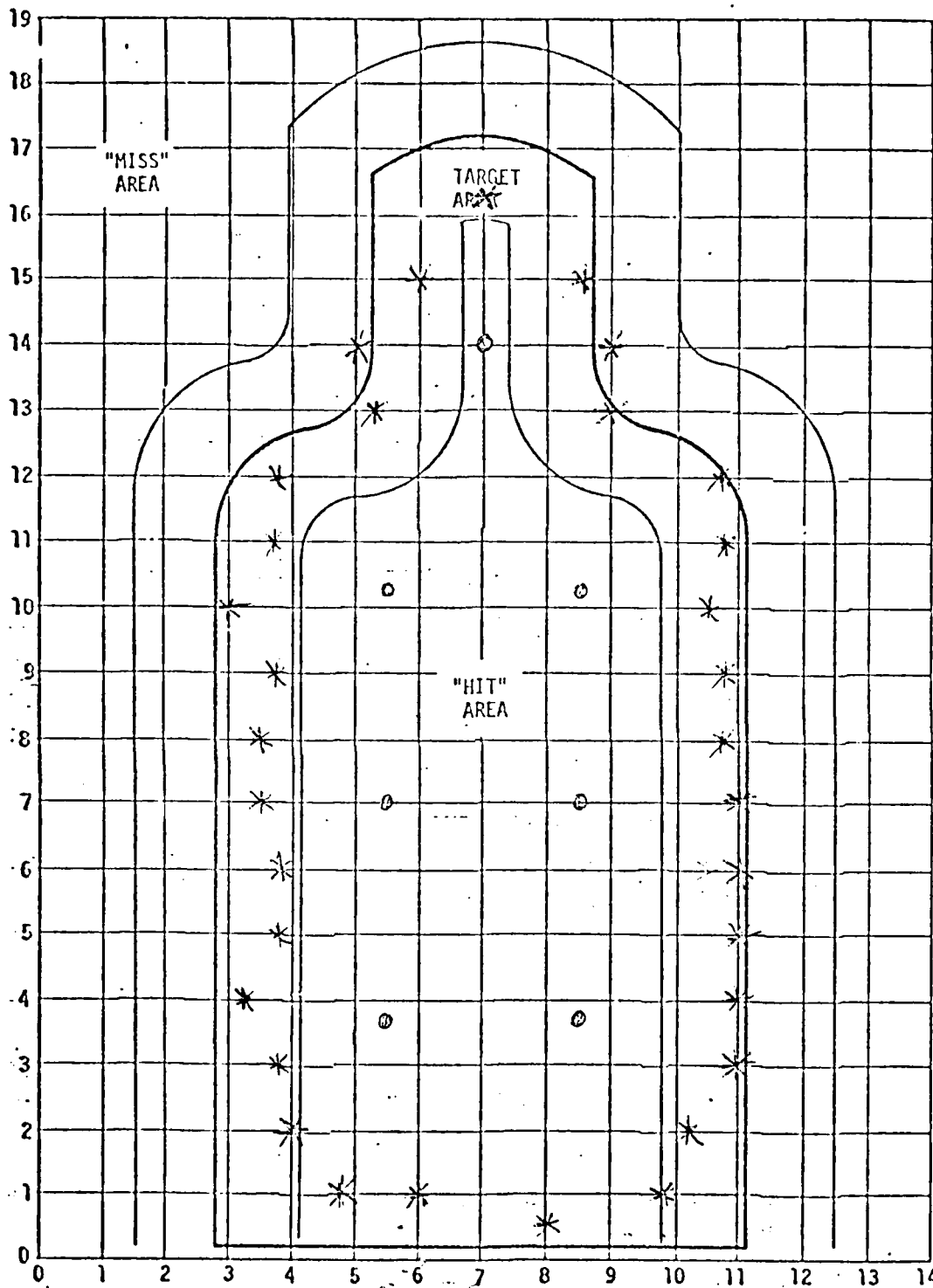
NOT ACCEPTABLE _____

59 APPROVAL BY: _____

TYPE TEST FIRE CASE TEST # 7
 TARGET RANGE 21 TYPE E DATE 11/1/70
 TEMPERATURE S/N _____ DETECTOR S/N _____
 RIFLE S/N 11/2 MFG. 11/1
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER _____
 MARKSMAN _____ TEST OPERATOR _____
 ATMOSPHERIC CONDITIONS/EST VISIBILITY _____
 TRANSMITTER MOUNTING TIME _____ ALIGNMENT TIME (IRON SIGHTS) _____
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE _____ ELEVATION _____
 SIMULATED VISIBILITY RANGE _____
 ATTENUATOR (ND) FILTERS USED _____
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____



Repositioned detectors

IP3450-3

E-Target Test Record Chart, 200 m (Sheet 3 of 4)

TEST RESULTS

ACCEPTABLE _____

NOT ACCEPTABLE _____

TEST CONDUCTED BY: Don J. Woods

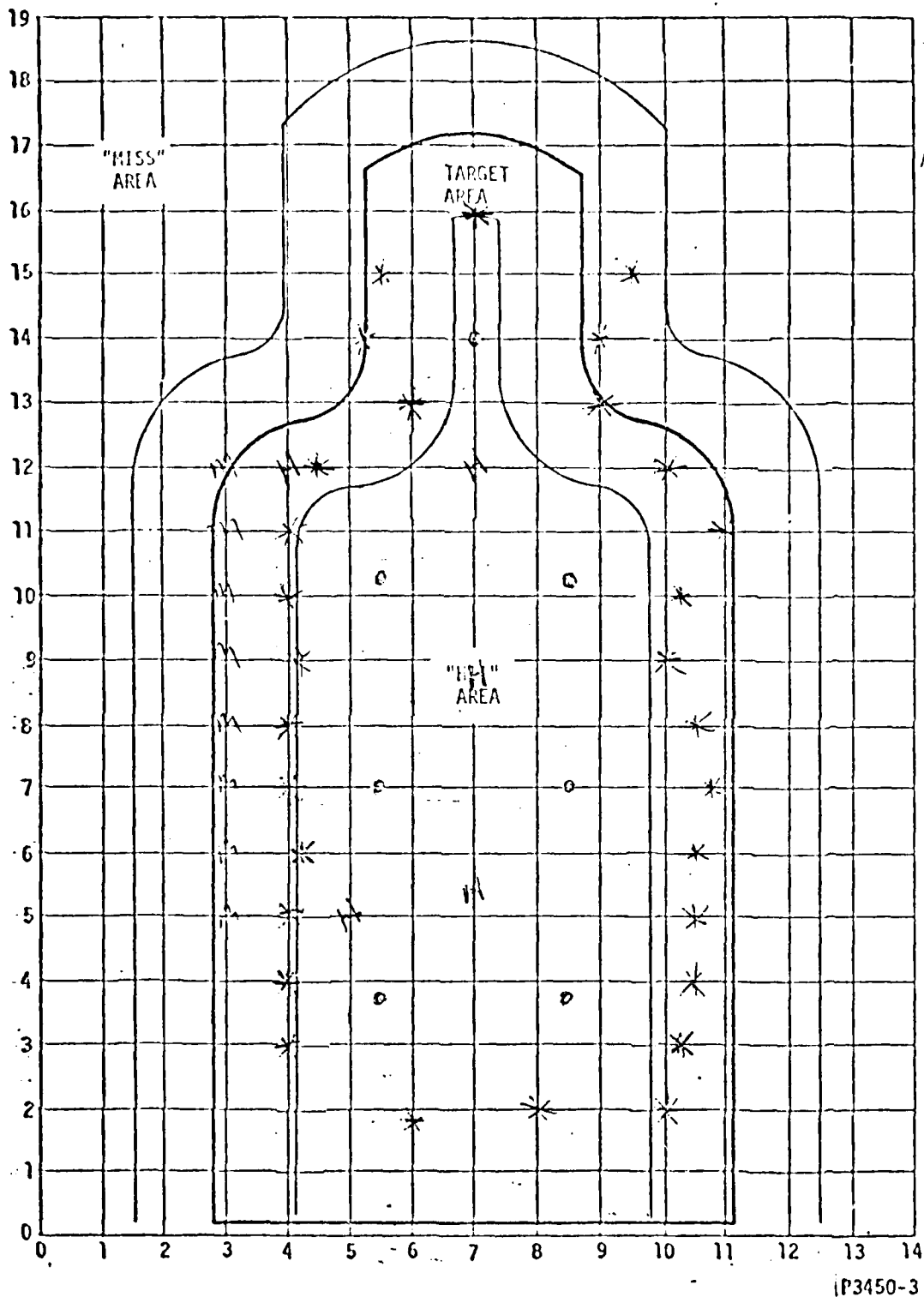
TEST WITNESSED BY: John A. Bailey

61 APPROVAL BY: _____

TYPE TEST FIELD SCENE TEST # 8
 TARGET RANGE 200 TYPE E DATE 2-22
 TEMPERATURE S/N _____ DETECTOR S/N _____
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN _____ TEST OPERATOR W. JONES
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR 60'
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE NA ELEVATION NA
 SIMULATED VISIBILITY RANGE NA
 ATTENUATOR (ND) FILTERS USED NA
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____



test I⁹
2/22/77
REDUCED
VIBRILITY
ND = .52
* PROFILE
SS
H = HIT
M = MISS

E-Target Test Record Chart, 200 m (Sheet 3 of 4)

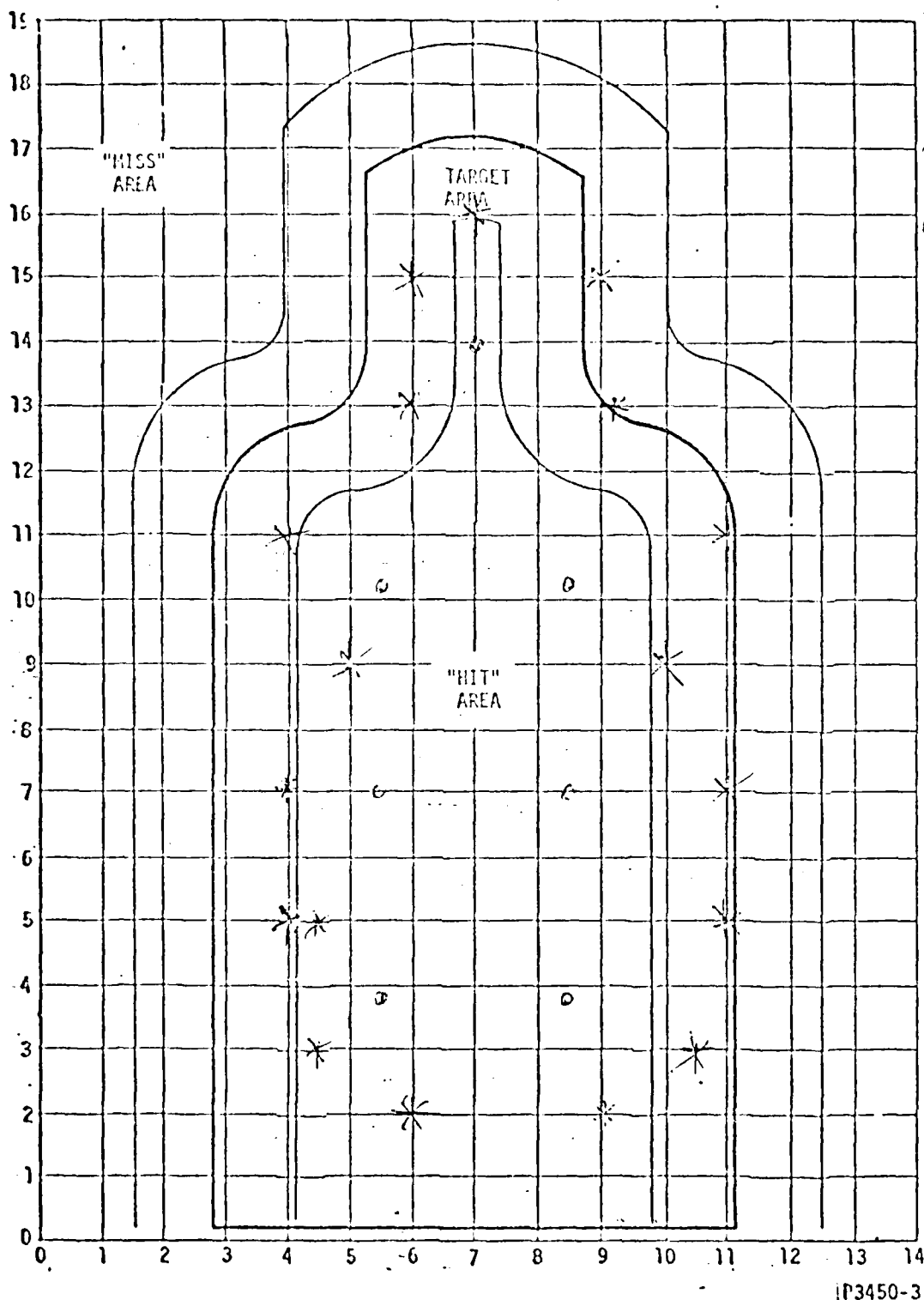
TEST RESULTS

ACCEPTABLE _____
NOT ACCEPTABLE _____

TEST CONDUCTED BY: John H. H. H.

TEST WITNESSED BY: John H. H. H.

63 APPROVAL BY: _____



test 10
2/22/77
REDUCED
1" BULIT
IV = .79

IP3450-3

E-Target Test Record Chart, 200 m (Sheet 3 of 4)

TEST RESULTS

ACCEPTABLE _____
NOT ACCEPTABLE _____

TEST CONDUCTED BY: Jack H. HinkleTEST WITNESSED BY: Jack H. Hinkle

64 APPROVAL BY: _____

2.4.1.2 Test Group Results (E&F Target, 150 to 15 m). Results of this test group are shown on test data sheets for tests 1 through 3 at 150 m, 4 through 7 at 100 m, 8 through 12 at 75 m, 13 and 14 at 50 m, 15 at 25 m, 16 at 15 m and as detailed in the following descriptions.

Test #1 (150 m) - Full visibility.

Test #2 (150 m) - Reduced visibility by 4 dB.

Test #3 (150 m) - Reduced visibility by 6.6 dB (ref. only, not part of acceptance criteria).

Test #4 (100 m) - Full visibility.

Test #5 (100 m) - Reduced visibility by 2.6 dB.

Test #6 - Omitted.

Test #7 (100 m) - Reduced visibility by 4 dB (ref. only, not part of acceptance criteria).

Test #8 (75 m) - Full visibility, unacceptable results.

Test #9 (75 m) - Moved detectors and retested, full visibility.

Test #10 (75 m) - Reduced visibility by 2 dB, unacceptable results.

Test #11 (75 m) - New detector locations, reduced visibility by 2 dB.

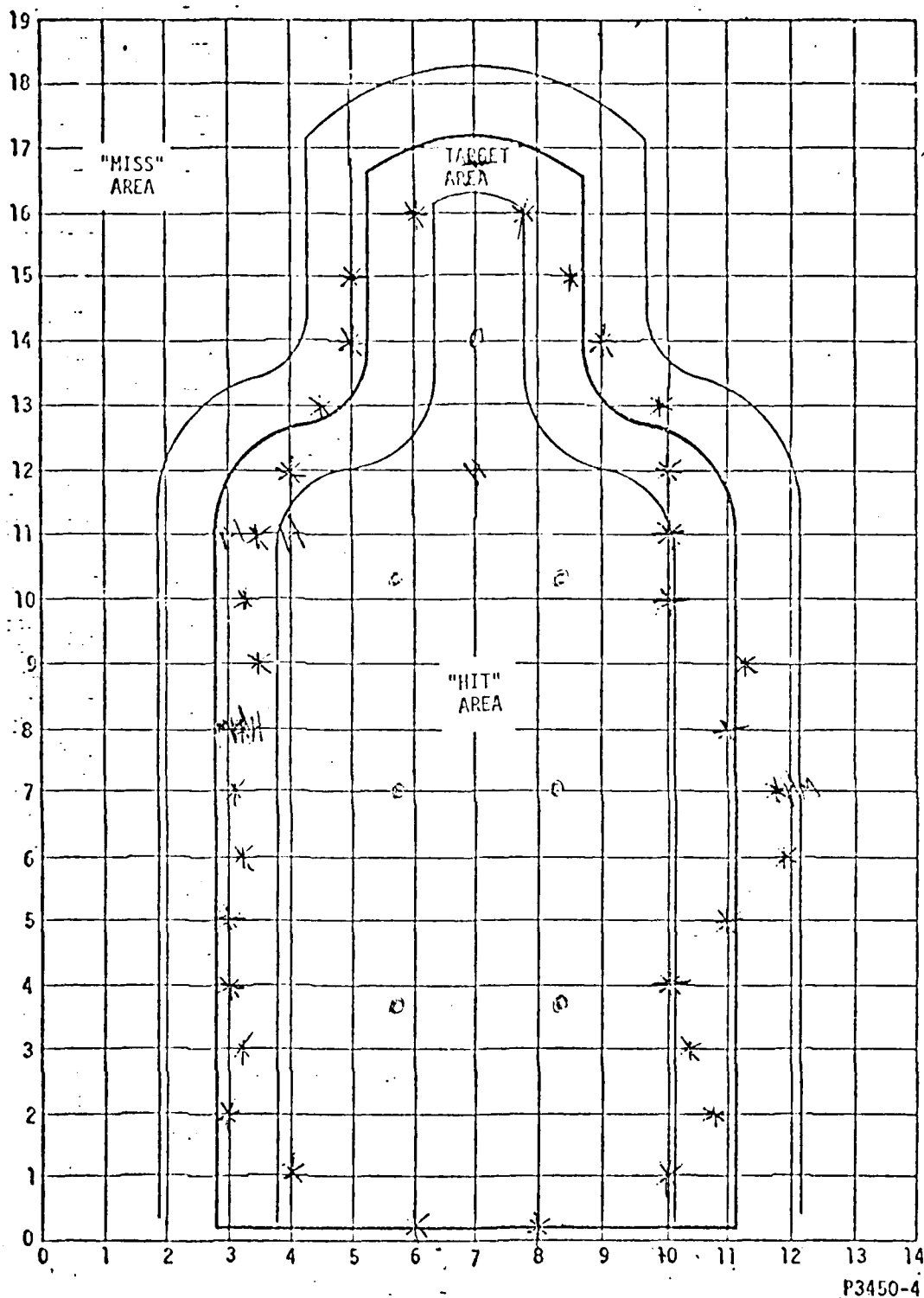
Test #12 (75 m) - Full visibility.

Test #13 (50 m) - Full visibility.

Test #14 (50 m) - Reduced visibility by 1.3 dB.

Test #15 (25 m) - Full visibility.

Test #16 (15 m) - Not part of program requirements.



E-Target Test Record Chart, 150 m (Sheet 4 of 4)

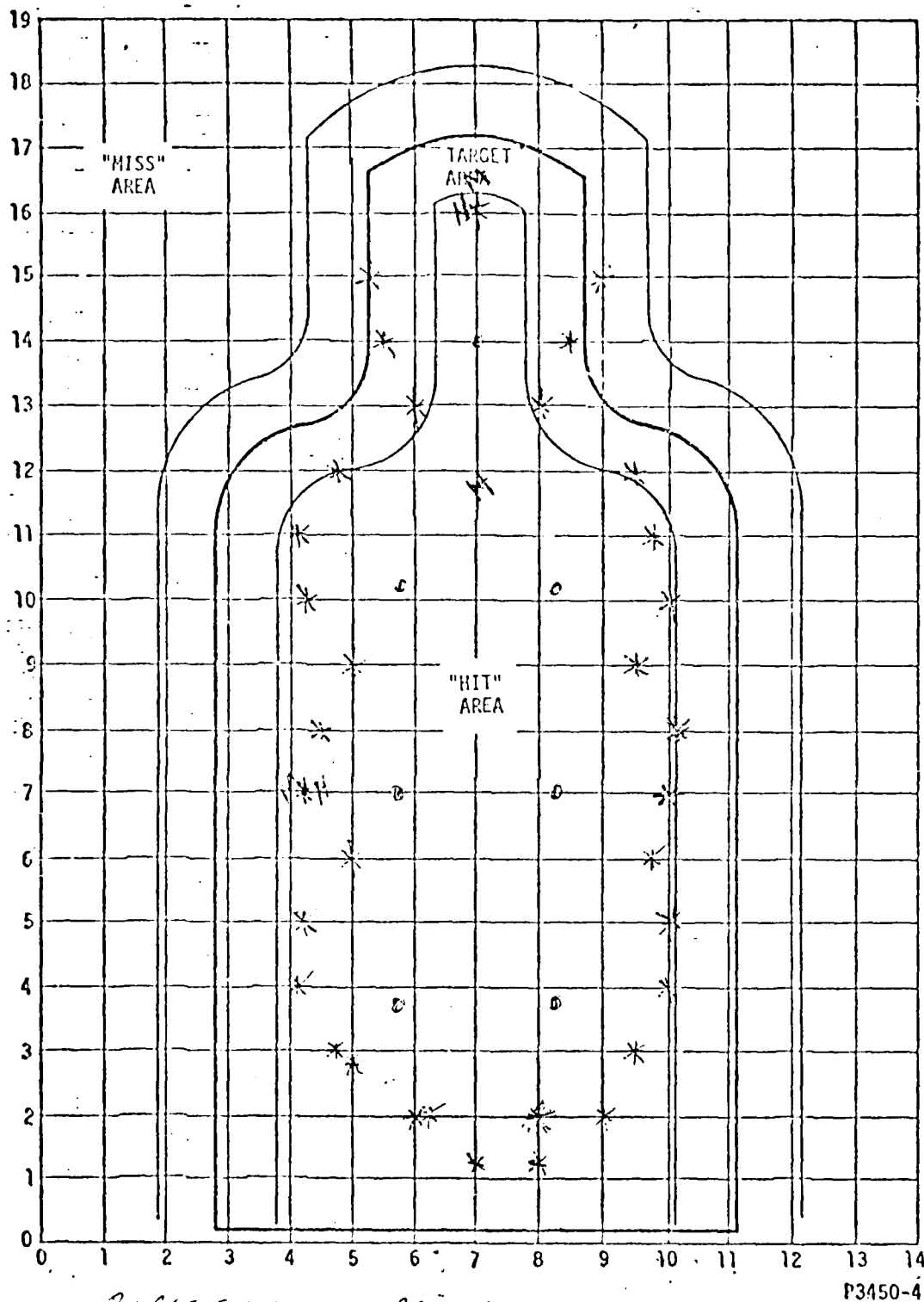
TEST RESULTS
 ACCEPTABLE _____
 NOT ACCEPTABLE _____
TEST CONDUCTED BY: DR WintersTEST WITNESSED BY: J. F. H. Hardy

APPROVAL BY: _____

TYPE TEST Full Scale TEST # 1
 TARGET RANGE 150 TYPE F DATE 2/23/77
 TEMPERATURE S/N 109 m.c. DETECTOR S/N 1510
 RIFLE S/N N/A MFG. N/A
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER L
 MARKSMAN _____ TEST OPERATOR LEEDS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY Clear Sunny 70°
 TRANSMITTER MOUNTING TIME N/A ALIGNMENT TIME (IRON SIGHTS) N/A
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE N/A ELEVATION N/A
 SIMULATED VISIBILITY RANGE N/A
 ATTENUATOR (ND) FILTERS USED N/A
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____



test #2

2/23/77

REDUCED

VISIBILITY

AD = 0.4

* = PROFILE

SS

H = HIT

M = MISS

E-Target Test Record Chart, 150 m (Sheet 4 of 4)

TEST RESULTS

ACCEPTABLE _____

NOT ACCEPTABLE _____

TEST CONDUCTED BY:

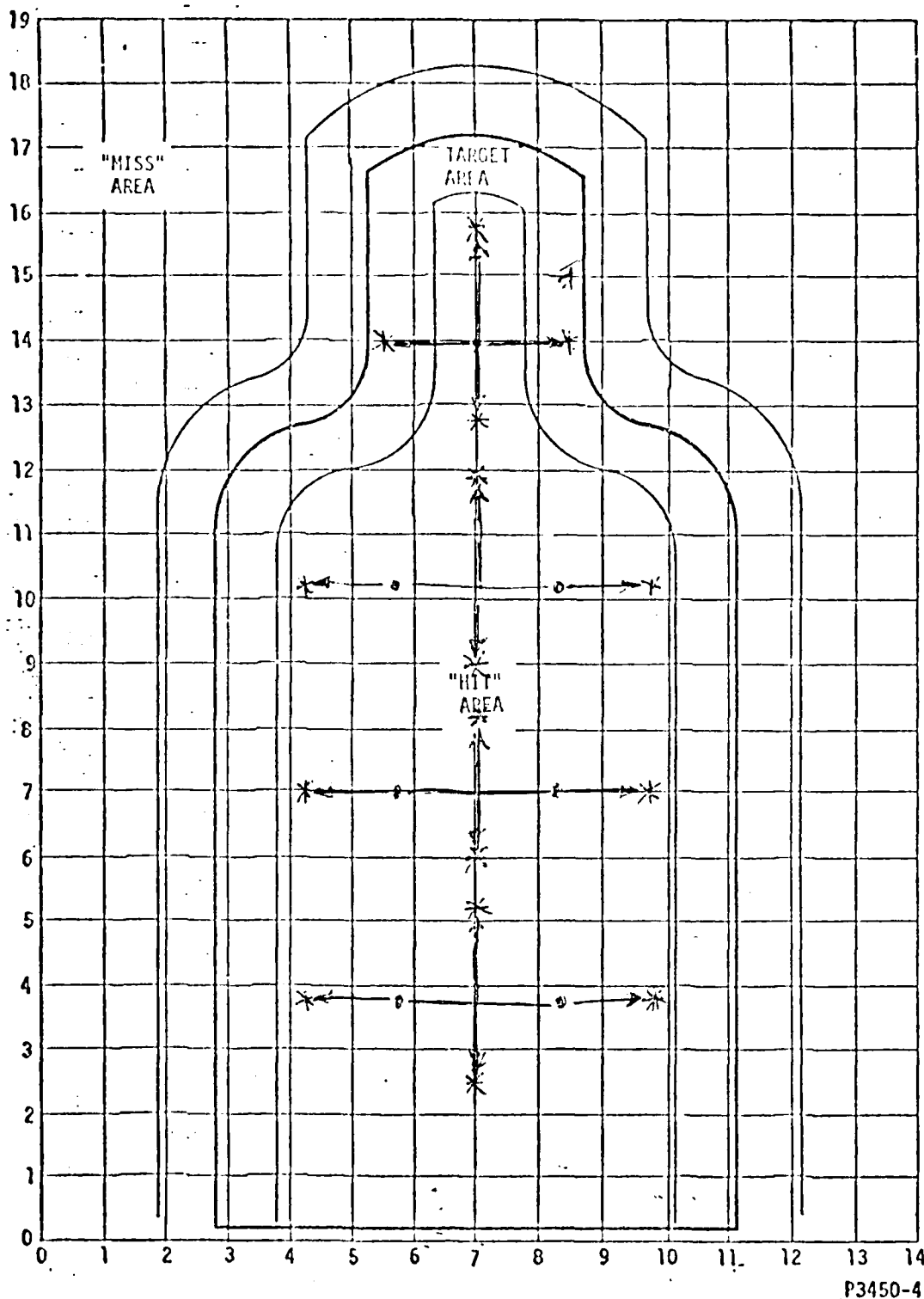
TEST WITNESSED BY:

69 APPROVAL BY: _____

TYPE TEST REDUCED VISIBILITY TEST # 2
 TARGET RANGE 15 TYPE E DATE 2/23/77
 TEMPERATURE S/N 400 100 DETECTOR S/N 300
 RIFLE S/N N/A MFG. N/A
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN _____ TEST OPERATOR W. J. DODS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR 3000' 100°
 TRANSMITTER MOUNTING TIME N/A ALIGNMENT TIME (IRON SIGHTS) N/A
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE N/A ELEVATION N/A
 SIMULATED VISIBILITY RANGE _____
 ATTENUATOR (ND) FILTERS USED 0.4
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____



LETH 3
 2/23/77
 REDUCED
 VISIBILITY
 NID = .655
 * = PROFILE

E-Target Test Record Chart, 150 m (Sheet 4 of 4)

TEST RESULTS

TEST CONDUCTED BY: *[Signature]*

ACCEPTABLE

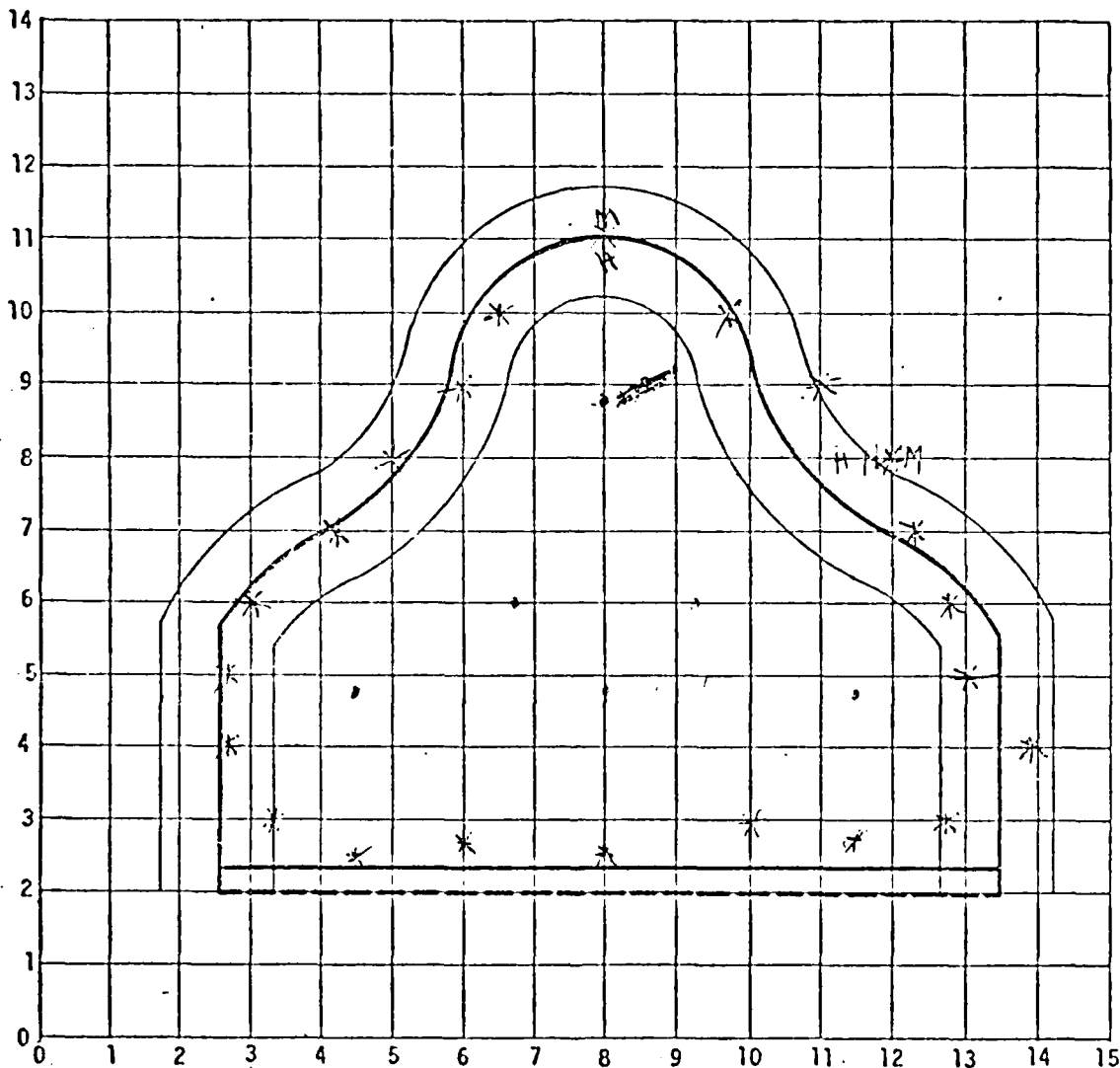
TEST WITNESSED BY: *[Signature]*

TYPE TEST REDUCED VISIBILITY TEST # 3
 TARGET RANGE 150 TYPE E DATE 2/23/77
 TEMPERATURE S/N 409 MW DETECTOR S/N SEN
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER L
 MARKSMAN _____ TEST OPERATOR LODDIS
 ATMOSPHERIC CONDITIONS/EST VISIBILITY PARTLY CLOUDY 68-70°
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE NA ELEVATION NA
 SIMULATED VISIBILITY RANGE PARTLY CLOUDY / WINDY / 68-70°
 ATTENUATOR (ND) FILTERS USED 505 + .15
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____

TEST #4
2/23/77
X=PROFILE
SS
H= HIT
M= MISS



BORE SIGHT AT RANGE

P3451

700 M
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE _____
NOT ACCEPTABLE _____

TEST CONDUCTED BY: G. R. Woods

TEST WITNESSED BY: [Signature]

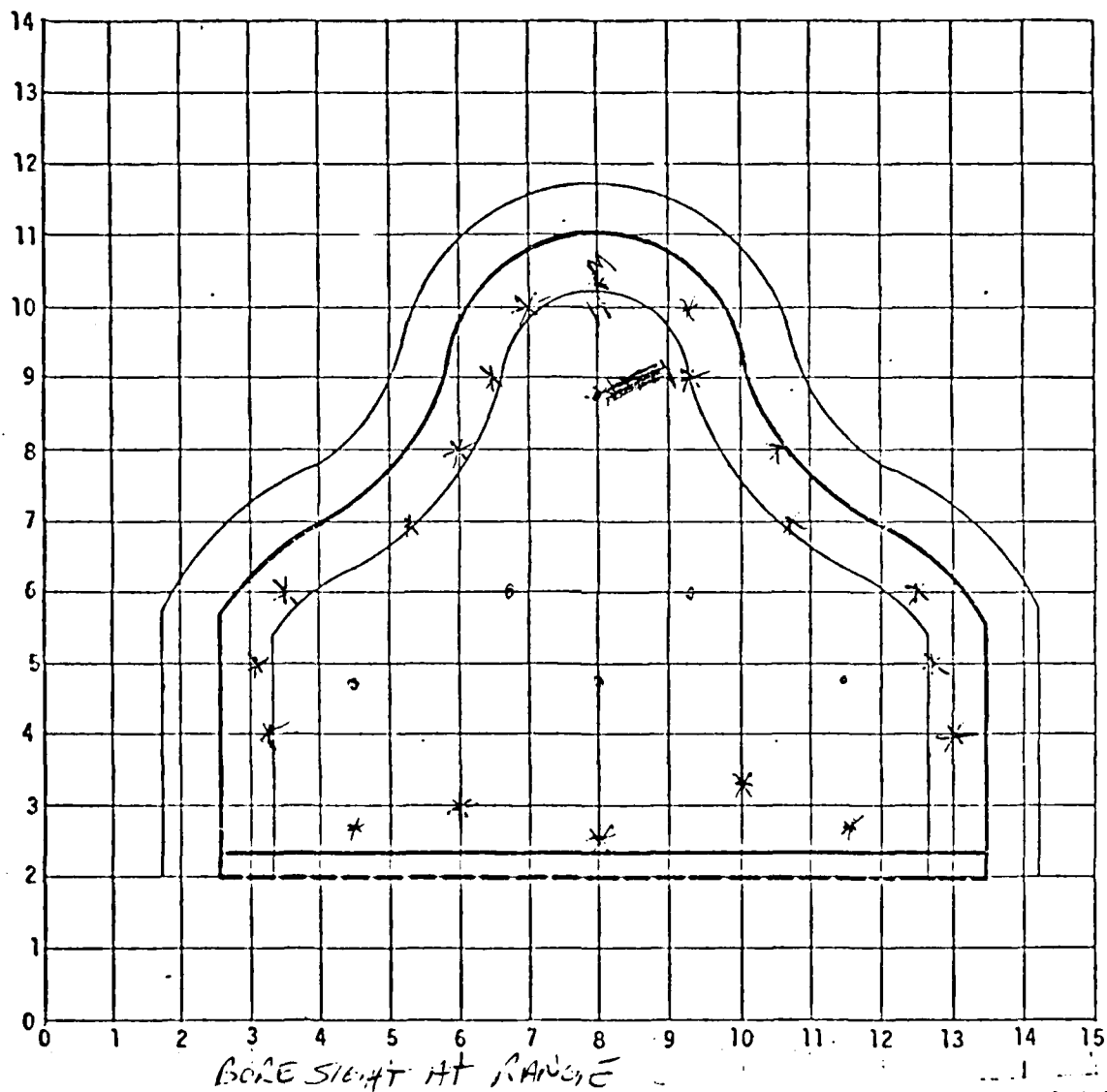
APPROVAL BY: _____

TYPE TEST FULL SCALE TEST # 4
 TARGET RANGE 100 M TYPE F DATE 2/23/77
 TEMPERATURE S/N 100 M DETECTOR S/N _____
 RIFLE S/N N/A MFG. N/A
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN _____ TEST OPERATOR 100 M
 ATMOSPHERIC CONDITIONS/EST VISIBILITY _____
 TRANSMITTER MOUNTING TIME N/A ALIGNMENT TIME (IRON SIGHTS) N/A
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE N/A ELEVATION N/A
 SIMULATED VISIBILITY RANGE _____
 ATTENUATOR (ND) FILTERS USED 2
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____

test #5
REDUCED VISIBILITY
2/23/77
ND = 0.24



P3451

100m
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE _____

NOT ACCEPTABLE _____

TEST CONDUCTED BY: DR WoodsTEST WITNESSED BY: John H. Hartley

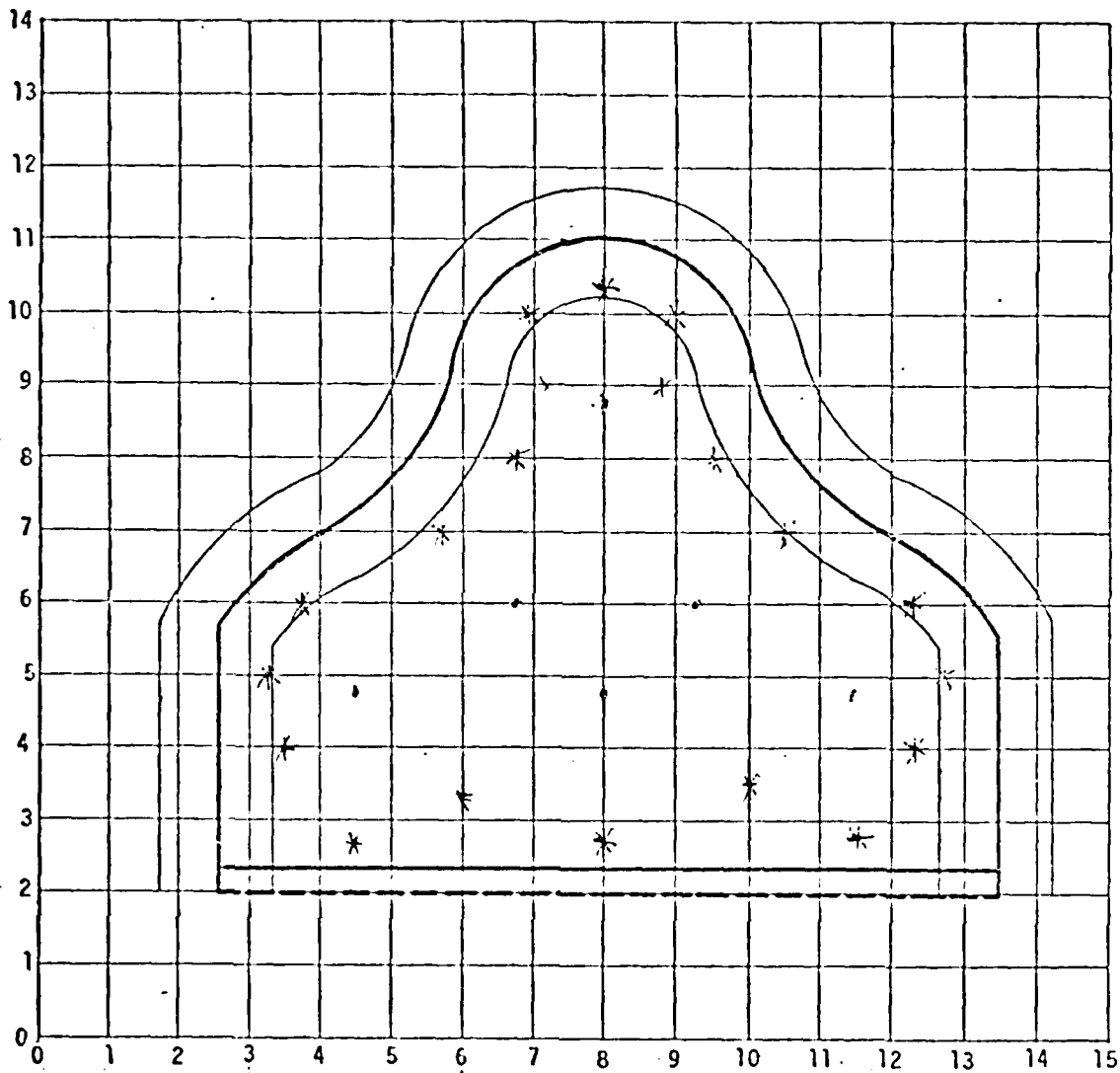
75 APPROVAL BY: _____

TYPE TEST REDUCED VISIBILITY TEST # 5
 TARGET RANGE 100 M TYPE F DATE 2/23/77
 TEMPERATURE S/N 409 MW DETECTOR S/N _____
 RIFLE S/N NA MFG. NA
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓
 MARKSMAN _____ TEST OPERATOR 60003
 ATMOSPHERIC CONDITIONS/EST VISIBILITY PARTLY CLOUDY 70"
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:
 WINDAGE NA ELEVATION NA
 SIMULATED VISIBILITY RANGE _____
 ATTENUATOR (ND) FILTERS USED 0.04
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) _____
 AIM POINT FOR HITS _____ OR MISSES _____

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = _____
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = _____

test #17
2/23/77
REDUCED VISIBILITY
ND = 0.4



P3451

100 m
F Target Test Record Chart

TEST RESULTS

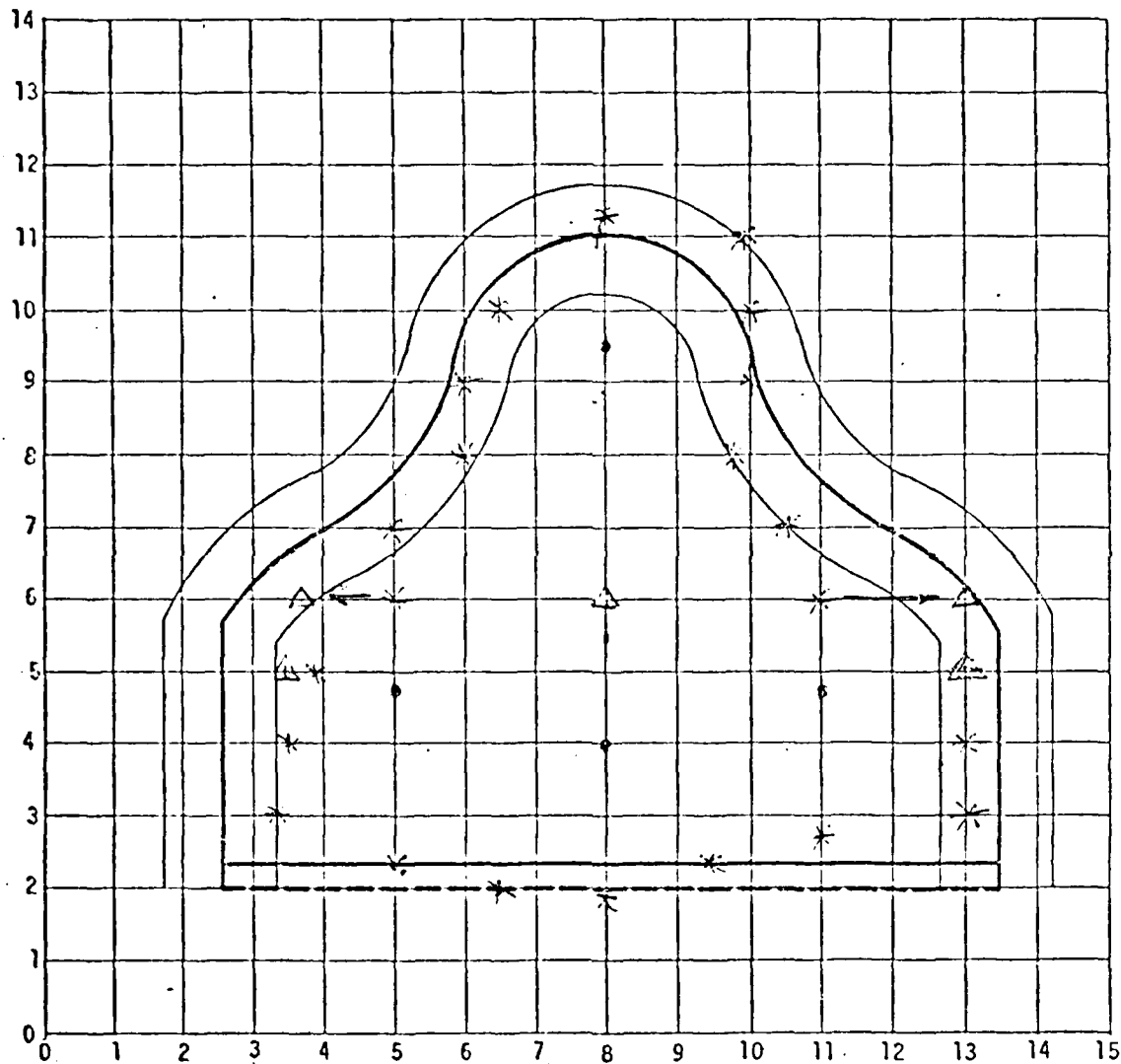
ACCEPTABLE _____
NOT ACCEPTABLE _____

TEST CONDUCTED BY: DR Woods

TEST WITNESSED BY: Jack H. Hildley

APPROVAL BY: _____

test #8
2/23/77



P3451

75 METERS
F Target Test Record Chart

TEST RESULTS

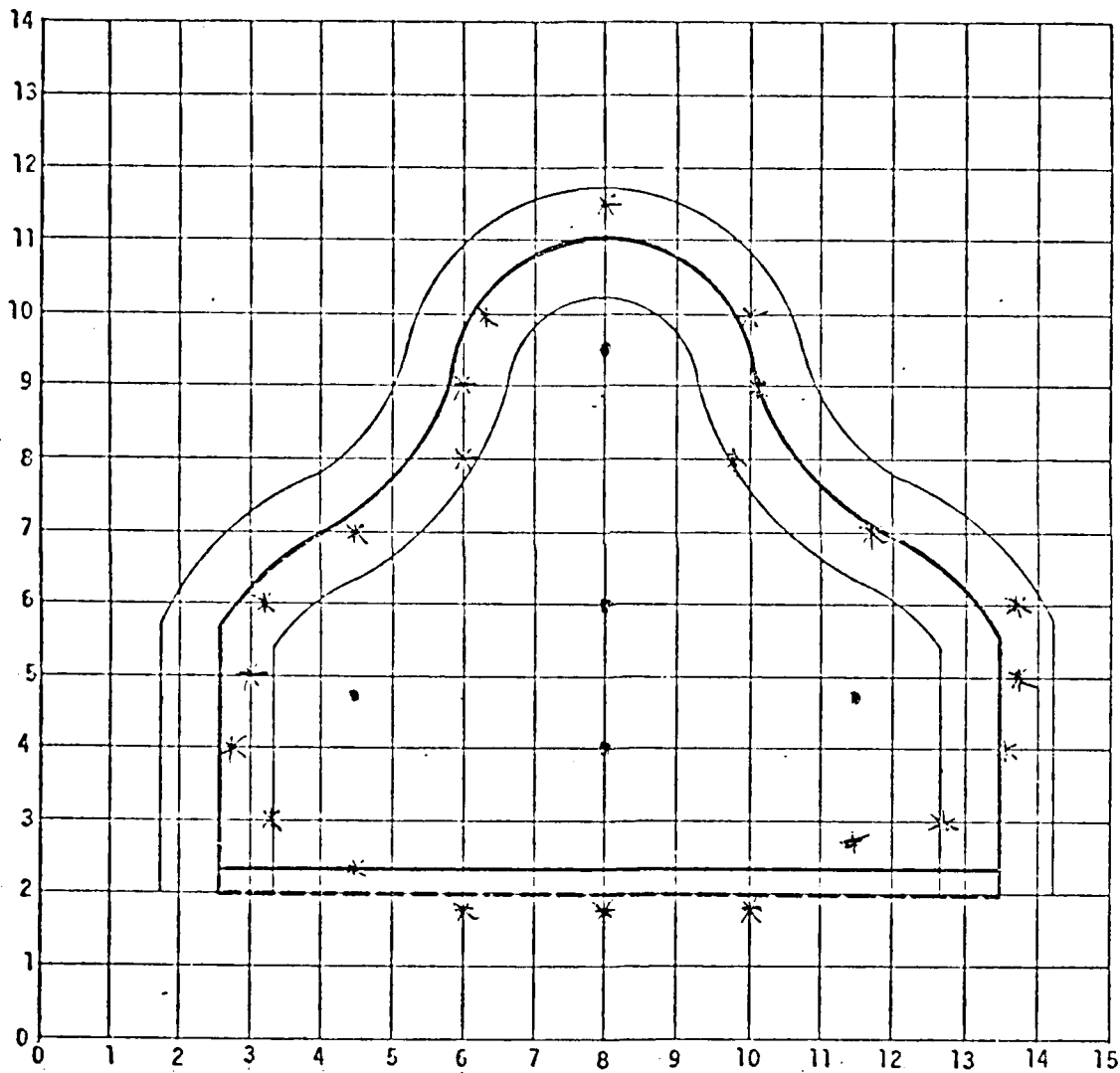
ACCEPTABLE _____
NOT ACCEPTABLE _____

TEST CONDUCTED BY: Don R. Woods

TEST WITNESSED BY: _____

APPROVAL BY: _____

Test # 9
2/23/77
Ret. r. moved?
det. c. w.



P3451

75 METERS
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE _____

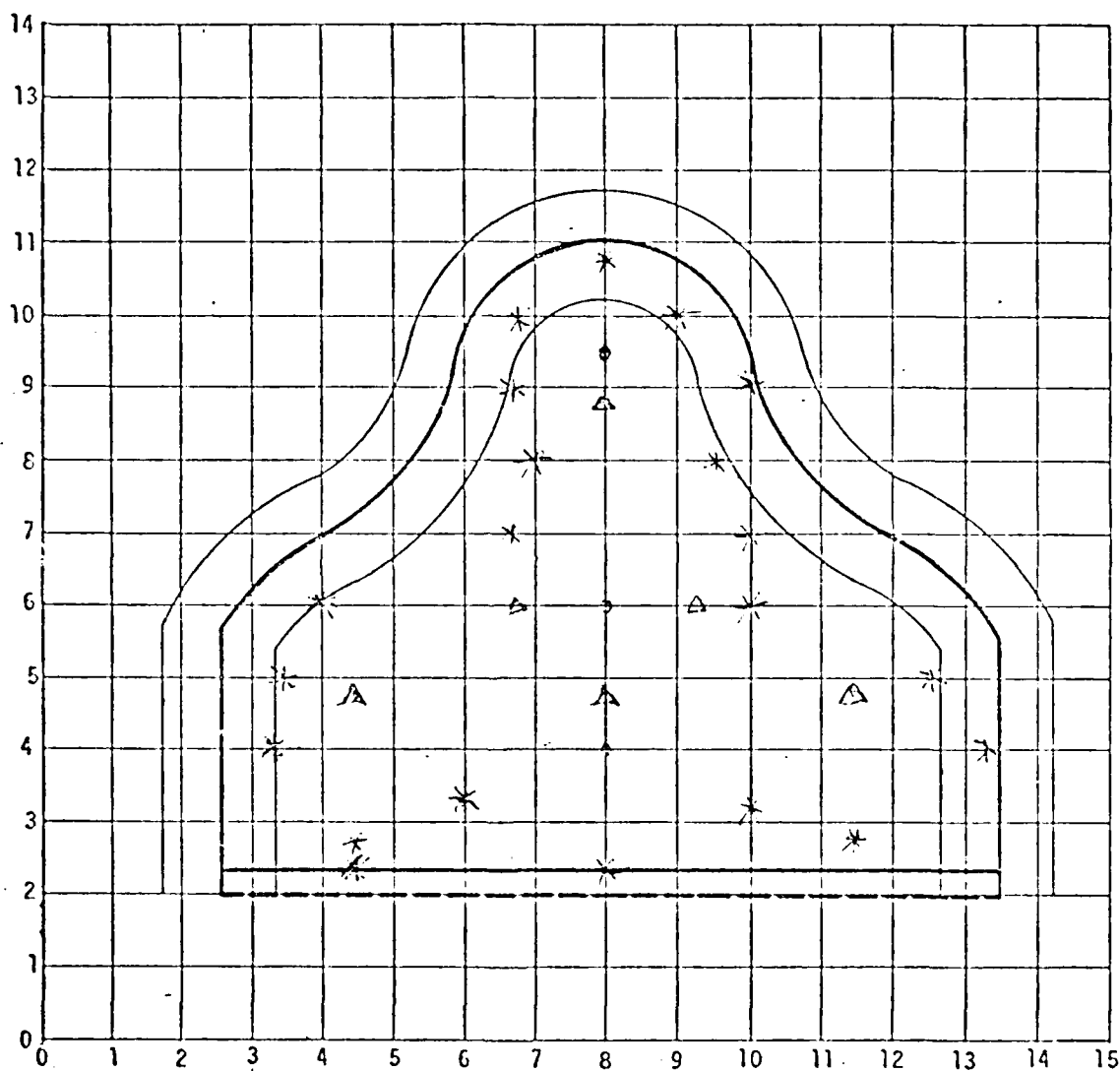
NOT ACCEPTABLE _____

TEST CONDUCTED BY: Don R. Wood

TEST WITNESSED BY: _____

79 APPROVAL BY: _____

test #10
2/23/77
REDUCED VISIBL
ND = 24



A CHANGED DETECTOR CONFIGURATION

P3451

75 M
F Target Test Record Chart

TEST RESULTS

TEST CONDUCTED BY: Don R. Lopez

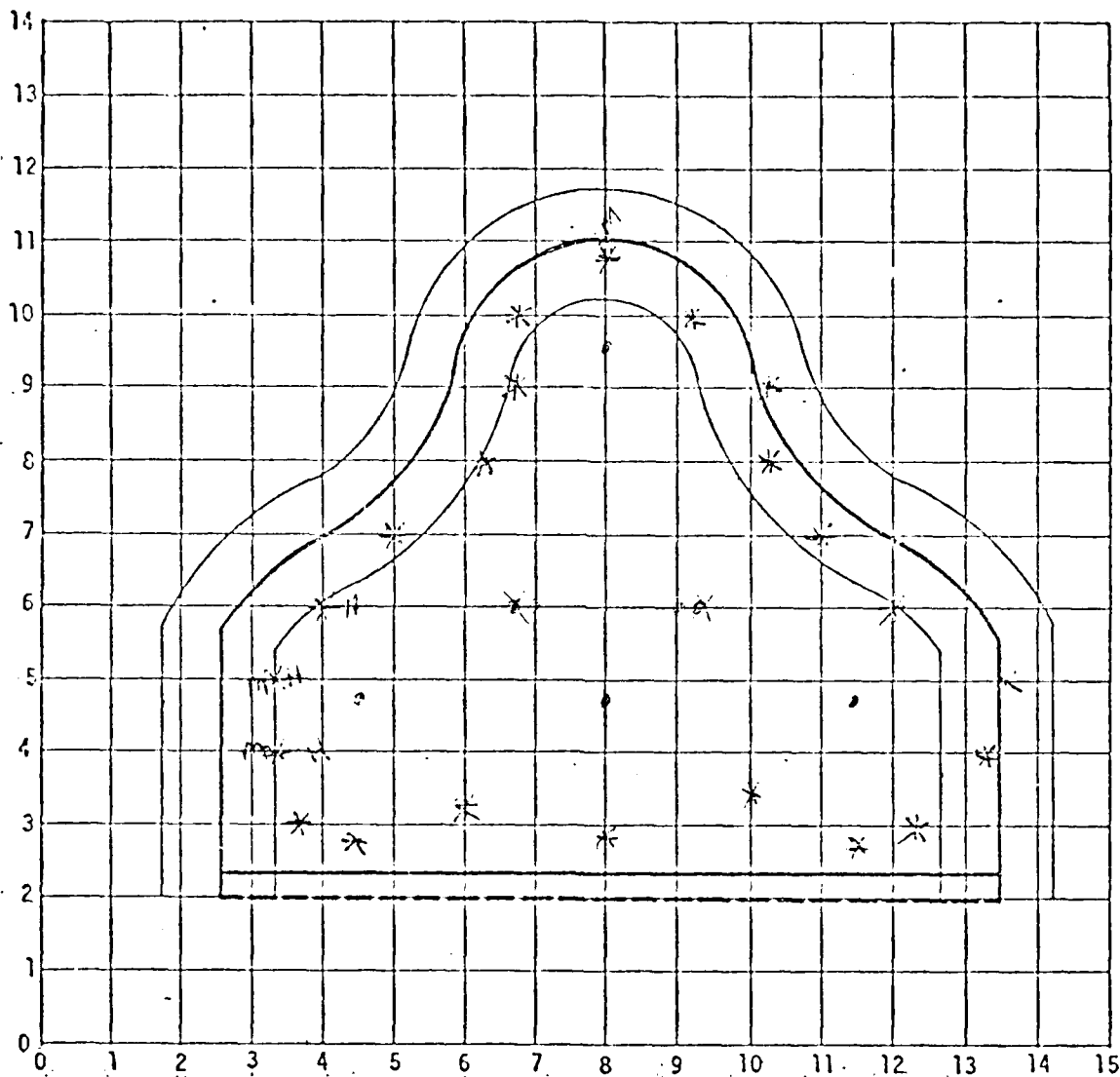
ACCEPTABLE _____

TEST WITNESSED BY: _____

NOT ACCEPTABLE _____

80 APPROVAL BY: _____

Test # 11
2/23/77
REDUCED VISIBILITY
ND = 024



P3451

75 METERS
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE _____

NOT ACCEPTABLE _____

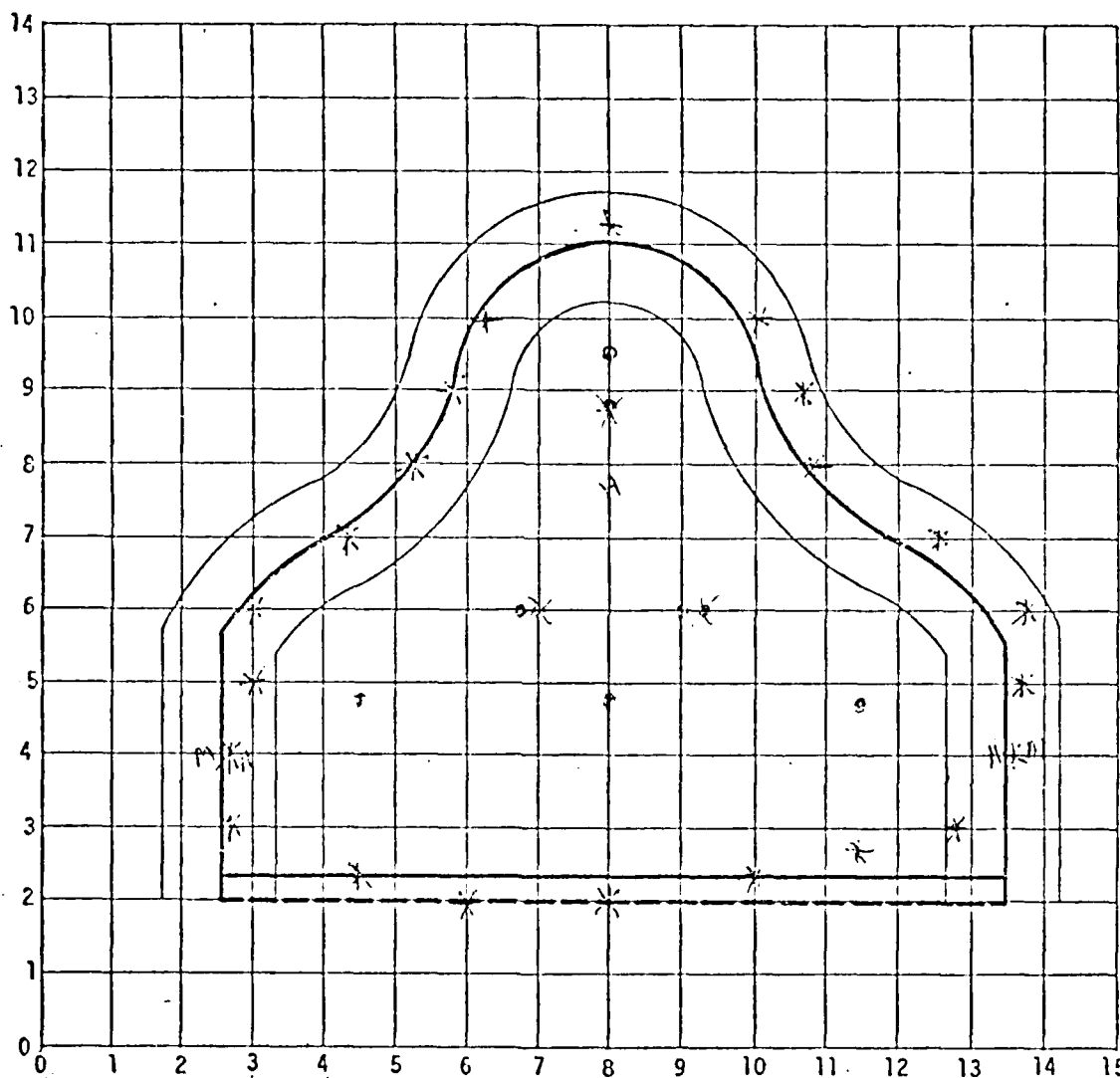
TEST CONDUCTED BY: Don B. Lister

TEST WITNESSED BY: James H. Hurdley

APPROVAL BY: _____

DATE: _____

TEST # 12
2/23/77
FULL VISIBILITY



P3451

75 METERS
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE _____

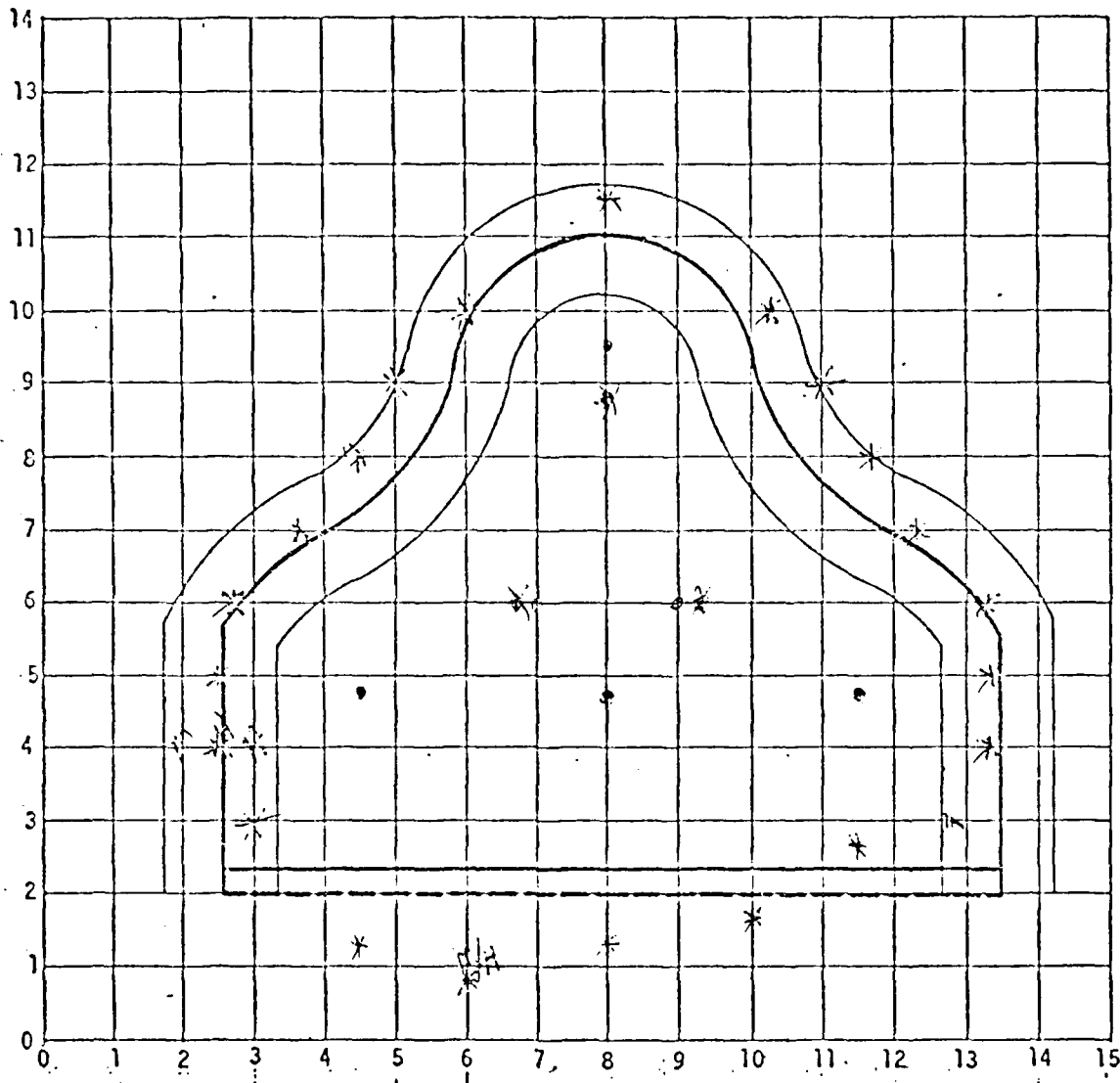
NOT ACCEPTABLE _____

TEST CONDUCTED BY: *[Signature]*

TEST WITNESSED BY: *[Signature]*

82 APPROVAL BY: _____

test # 13
2/23/77



P3451

50 METERS
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE _____
NOT ACCEPTABLE _____

TEST CONDUCTED BY: _____

TEST WITNESSED BY: _____

APPROVAL BY: _____

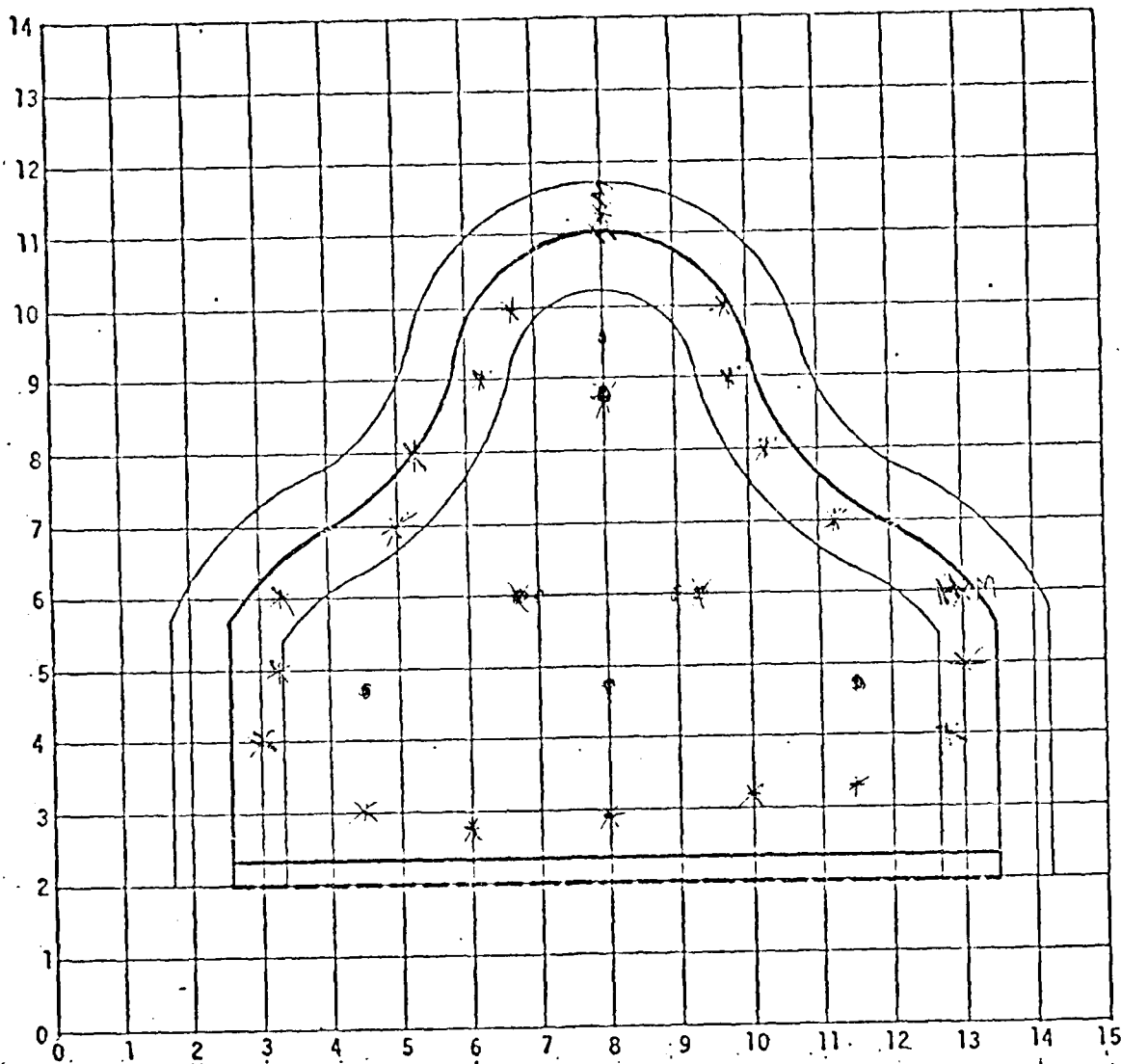
DATE: _____

test # 14

2-23-77

REDUCED VISIBILITY

ND = .15



P3451

50 METER
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE _____

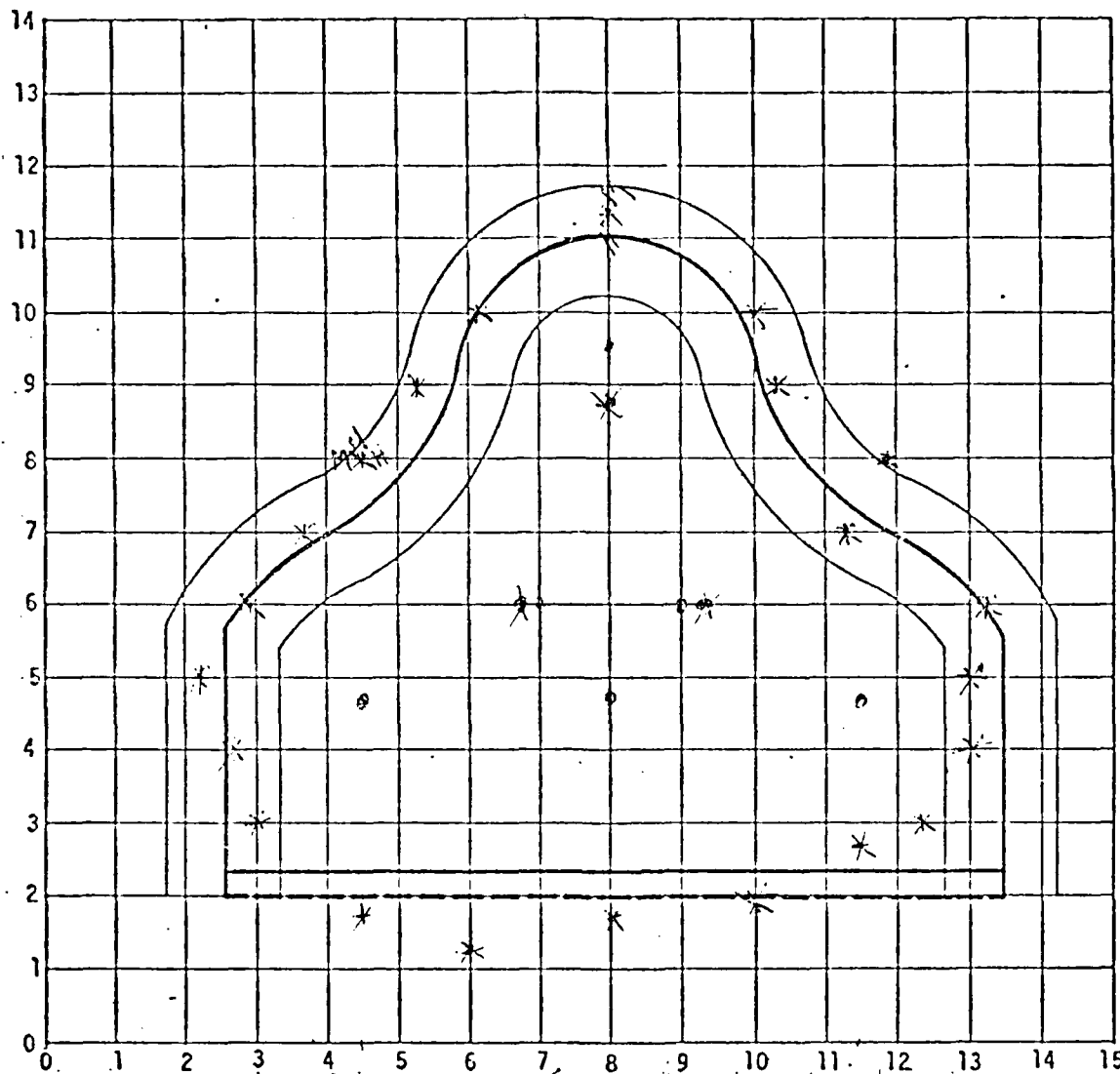
NOT ACCEPTABLE _____

TEST CONDUCTED BY: Don R. Woods

TEST WITNESSED BY: Jack G. Hawk

APPROVAL BY: _____

test # 15
2/23/77



P3451

2-5 meters
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE _____

NOT ACCEPTABLE _____

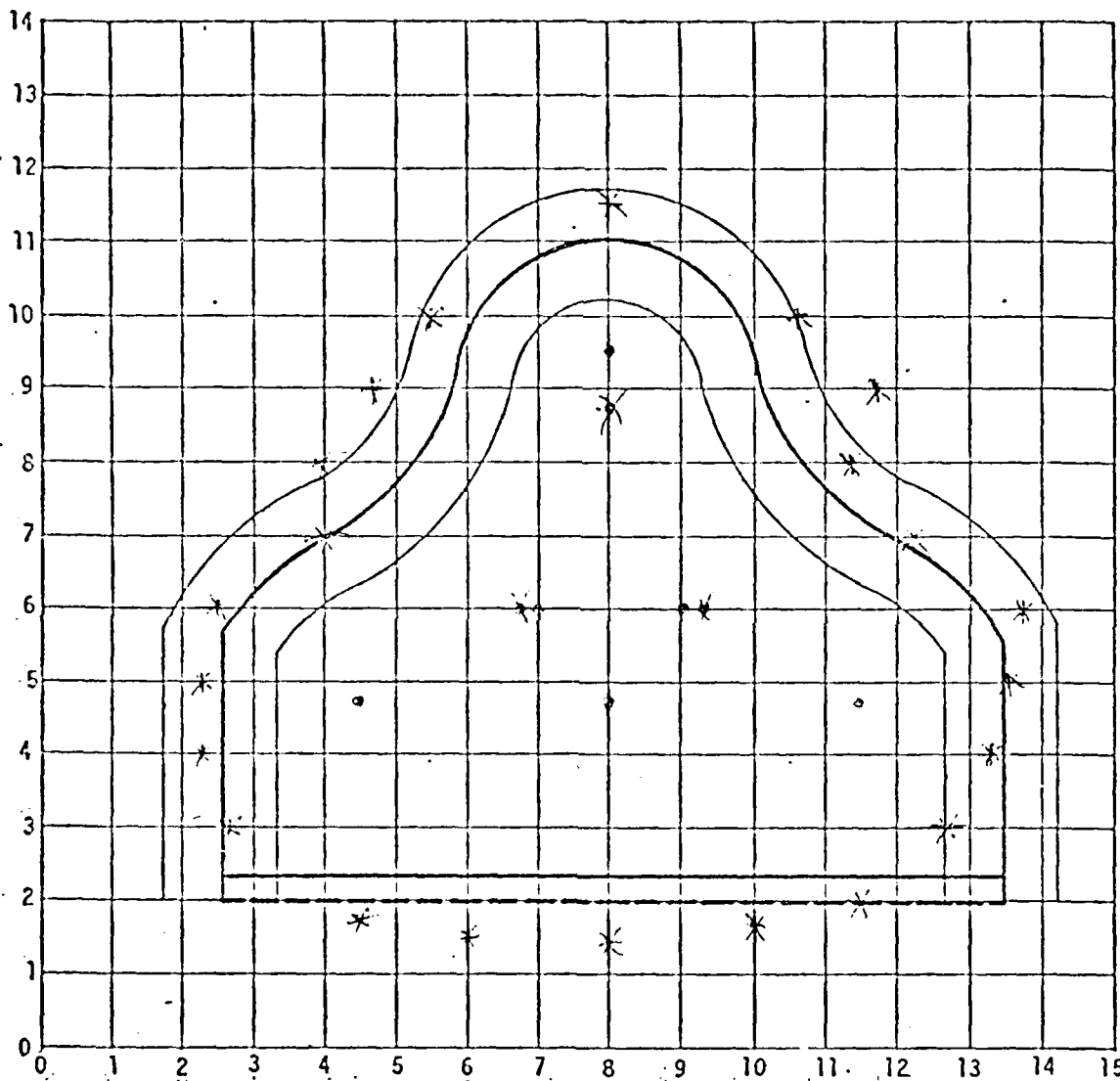
TEST CONDUCTED BY: Don R. Wood

TEST WITNESSED BY: Jack H. Penning

APPROVAL BY: _____

DATE: _____

test #16
2/23/77



P3451

15 METERS
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE _____

NOT ACCEPTABLE _____

TEST CONDUCTED BY: Don R. Wood

TEST WITNESSED BY: John D. Hanks

APPROVAL BY: _____

2.5 OPERATION UNDER AMBIENT LIGHT CONDITIONS

The test setup and procedure was as described in paragraph 2.3 of the Demonstration Test Plan.

2.5.1 SYSTEM OPERATION UNDER VARYING AMBIENT LIGHT CONDITIONS (OBJECTIVE A). System operation under varying ambient light conditions was effectively demonstrated during the Effective Simulation Demonstration, paragraph 2.4.1 of this report.

2.5.1.1 Test Results (Objective A). Results of this test are documented in the test data sheets of paragraph 2.4.1 of this report, Effective Simulation Demonstration.

2.5.2 SYSTEM INVULNERABILITY TO AMBIENT LIGHT INDUCED FALSE ALARMS (OBJECTIVE B). The test target, with detectors mounted and hit counter connected was placed outdoors in clear bright sunlight and was operated continuously for five hours and five minutes.

2.5.2.1 Test Results (Objective B). No ambient light induced false alarms were recorded (see test form).

Operation Under Ambient Light Conditions

TYPE TEST Interference Test TEST # 1
 TARGET RANGE - TYPE - DATE 2/25
 TEMPERATURE - HUMIDITY - TIME 10:05 PM
 DETECTOR S/N 11 TEST OPERATOR J. J. J.
 ATMOSPHERIC CONDITIONS/EST VISIBILITY Clear bright sun

	NO.	START TIME	END TIME	DURATION	# FALSE HITS
		<u>12:15 2/26</u>	<u>10:10 AM</u>	<u>5h 5m</u>	<u>NONE</u>
Total					

TEST RESULTS

ACCEPTABLE
 NOT ACCEPTABLE

TEST CONDUCTED BY: J. J. J.TEST WITNESSED BY: APPROVAL BY: DATE:

Test Form

2.6 EFFECTIVE SIMULATION OF FIRING WITH SERVICE AMMUNITION AT SCALED RECORD FIRE RANGE

The test setup was as described in paragraph 2.5 of the Demonstration Test Plan. However, the test procedure was modified, by the NTEC MAGLAD Project Manager, to perform target profiling rather than fire at selected aim points per the Demonstration Test Plan.

2.6.1 EFFECTIVE SIMULATION DEMONSTRATION, SCALE. The scale target mechanism was mounted on the x-y positioner, along with the test detector and indicator used during the alignment tolerance demonstration. After determining the laser beam centroid and centering the test detector, the transmitter sighting scope crosshairs were adjusted to center on the parallax displaced aim point attached to the test detector.

This procedure was repeated at each range, to ensure parallel sight alignment, after focusing the sighting scope on the target.

The target was profiled in the same fashion as in the full scale demonstration except the target rather than the transmitter was scanned.

2.6.1.1 Test Group Results, Scale. Results of this test group are shown on subsequent test data sheets and are detailed in the following descriptions.

Test #1, 25 Feb 77 (E-Target, Scale 300 m) - Target profile assuming symmetry.

Test #1, 2, 3, 28 Feb 77 (F-Target, Scale 50 and 100 m) - Target profile assuming symmetry.

A comparison of E-target edge profiles assuming symmetry with selected aim points indicated that the target was asymmetrical. All following target profiles are based on a test grid coordinate starting point.

NAVTRAEQUIPCEN N51339-76C-0116-1

Test #4, 28 Feb 77 (E-Target) - Scaled 150 m

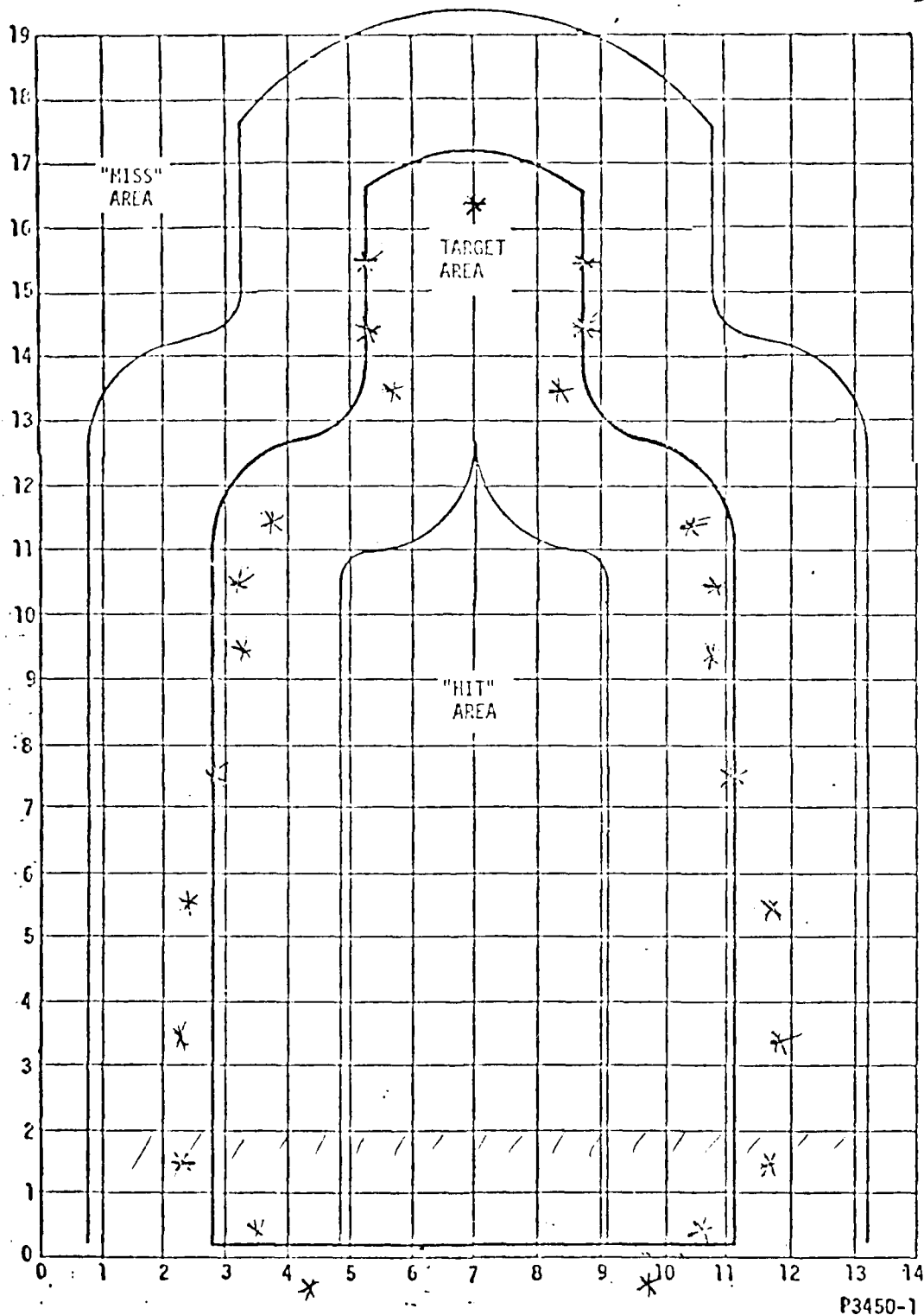
Test #1, 1 Mar 77 (E-Target) - Scaled 150 m

Test #2, 1 Mar 77 (E-Target) - Scaled 200 m

Test #3, 1 Mar 77 (E-Target) - Scaled 250 m

Test #4, 1 Mar 77 (E-Target) - Scaled 300 m, indications of
boresight error

Test #5, 1 Mar 77 (E-Target) - Scaled 300 m, reboresight

test #1
2/25/77


P3450-1

E-Target Test Record Chart, ^{SCALE} 300 m (Sheet 1 of 4)

TEST RESULTS

ACCEPTABLE

NOT ACCEPTABLE

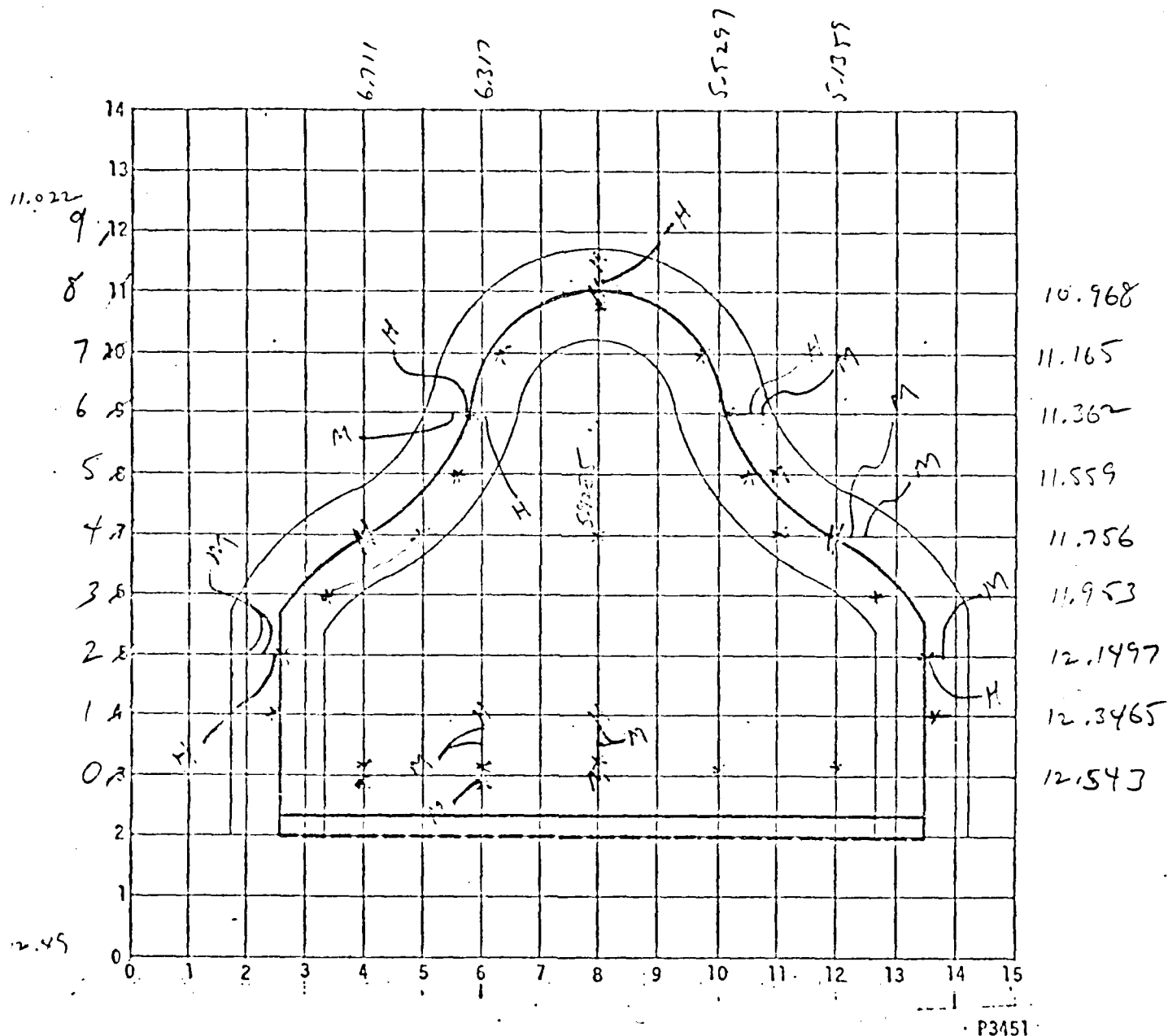
TEST CONDUCTED BY: Don R. Woods

TEST WITNESSED BY: John H. Montley

91 APPROVAL BY:

2/28/77

10.968


SCALE 50 m
F Target Test Record Chart

TEST RESULTS

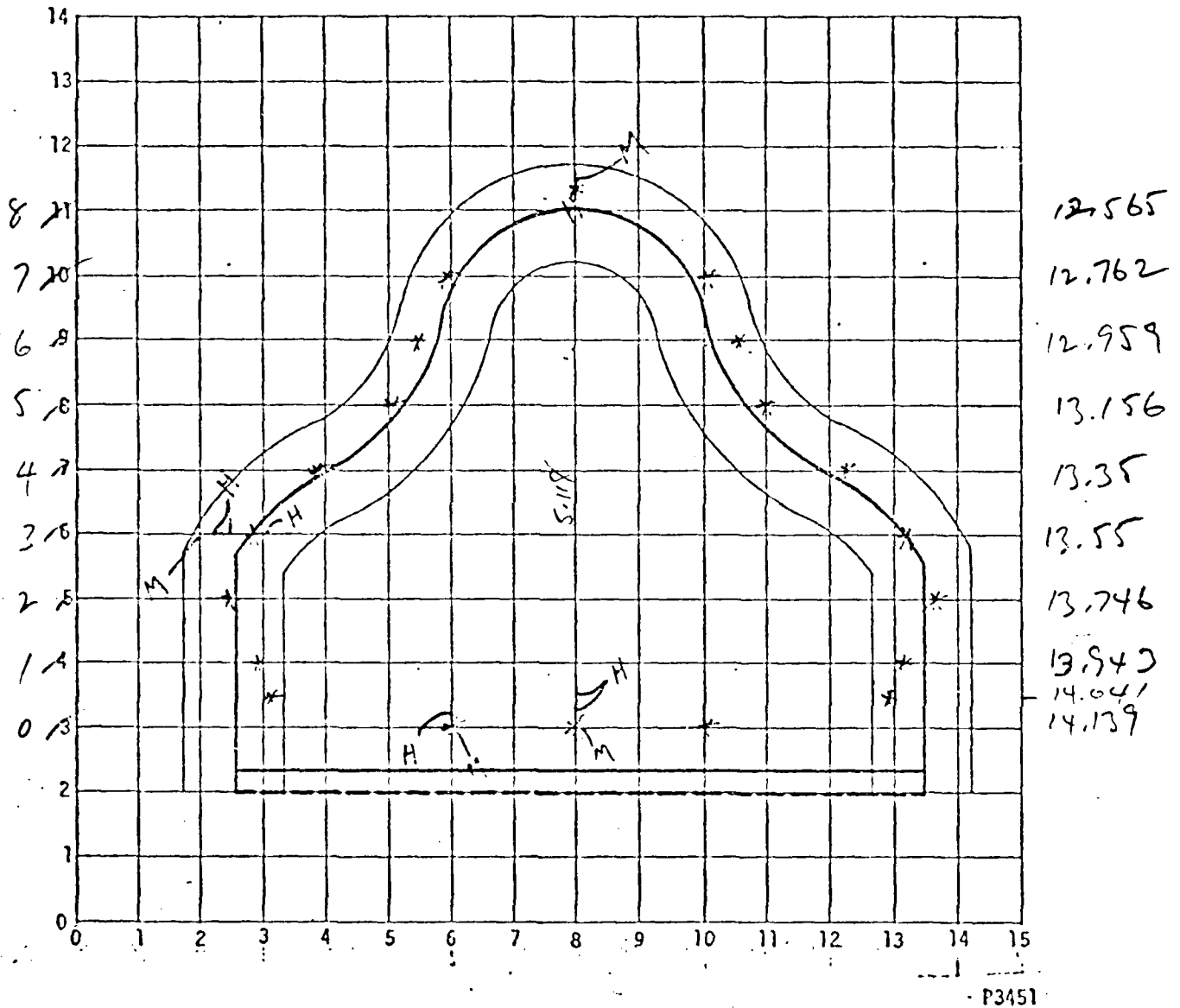
ACCEPTABLE _____
NOT ACCEPTABLE _____

TEST CONDUCTED BY:

TEST WITNESSED BY:

APPROVAL BY:

2/28/77
#2



SCALE 100m
F Target Test Record Chart

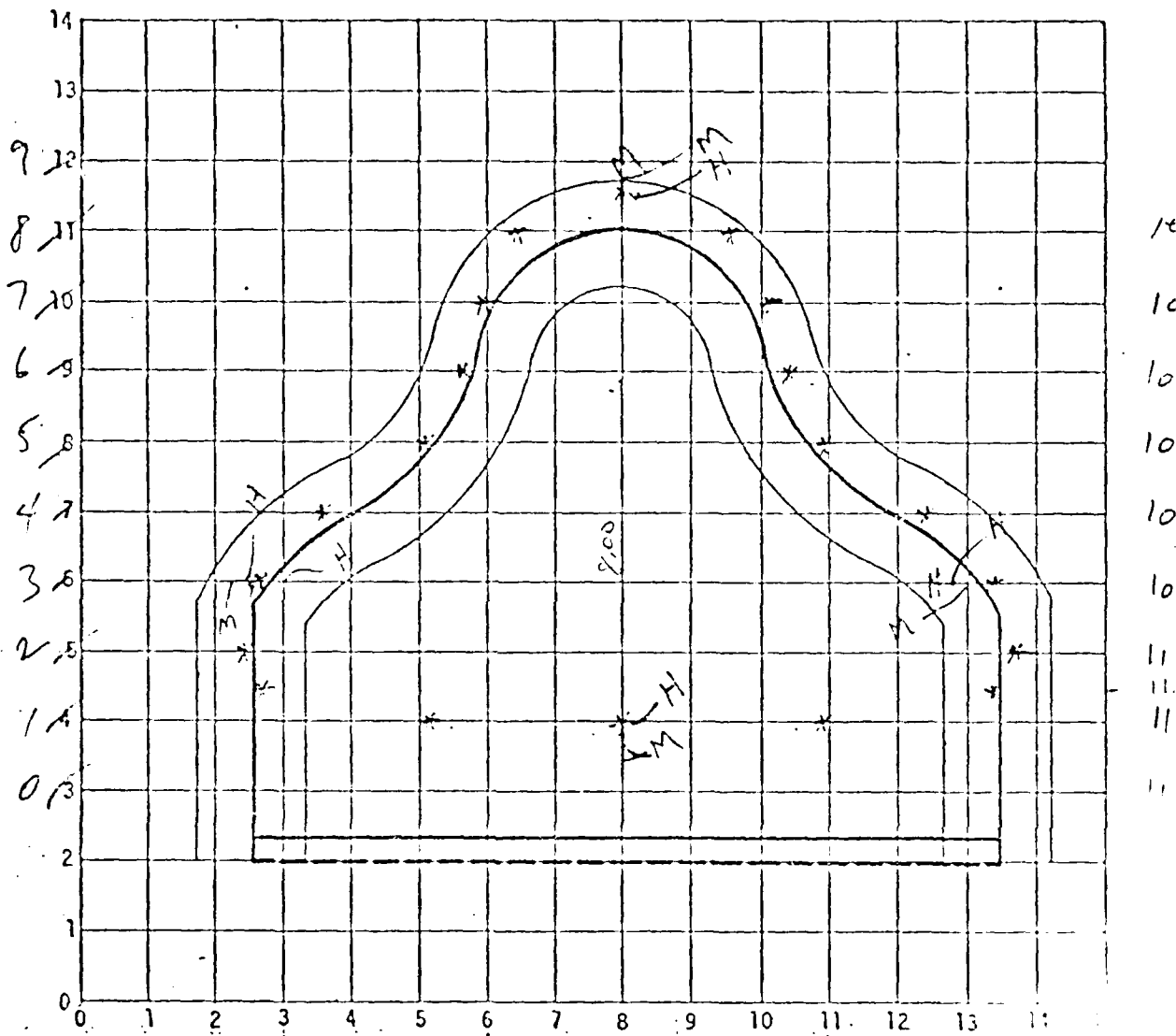
TEST RESULTS

ACCEPTABLE _____
NOT ACCEPTABLE _____

TEST CONDUCTED BY: _____

TEST WITNESSED BY: _____

APPROVAL BY: _____



SCALE 50 m
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE _____

NOT ACCEPTABLE _____

TEST CONDUCTED BY: _____

TEST WITNESSED BY: _____

APPROVAL BY: _____

AD-A092 477

INTERNATIONAL LASER SYSTEMS INC ORLANDO FL
MAGLAD. TRAINER ENGINEERING REPORT DEMONSTRATION RESULTS.(U)
MAR 77 D R WOODS

F/6 5/9

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NAVTRAE@UIPC-76-C-0116-3

NL

UNCLASSIFIED

2 of 2

8/10/12

END

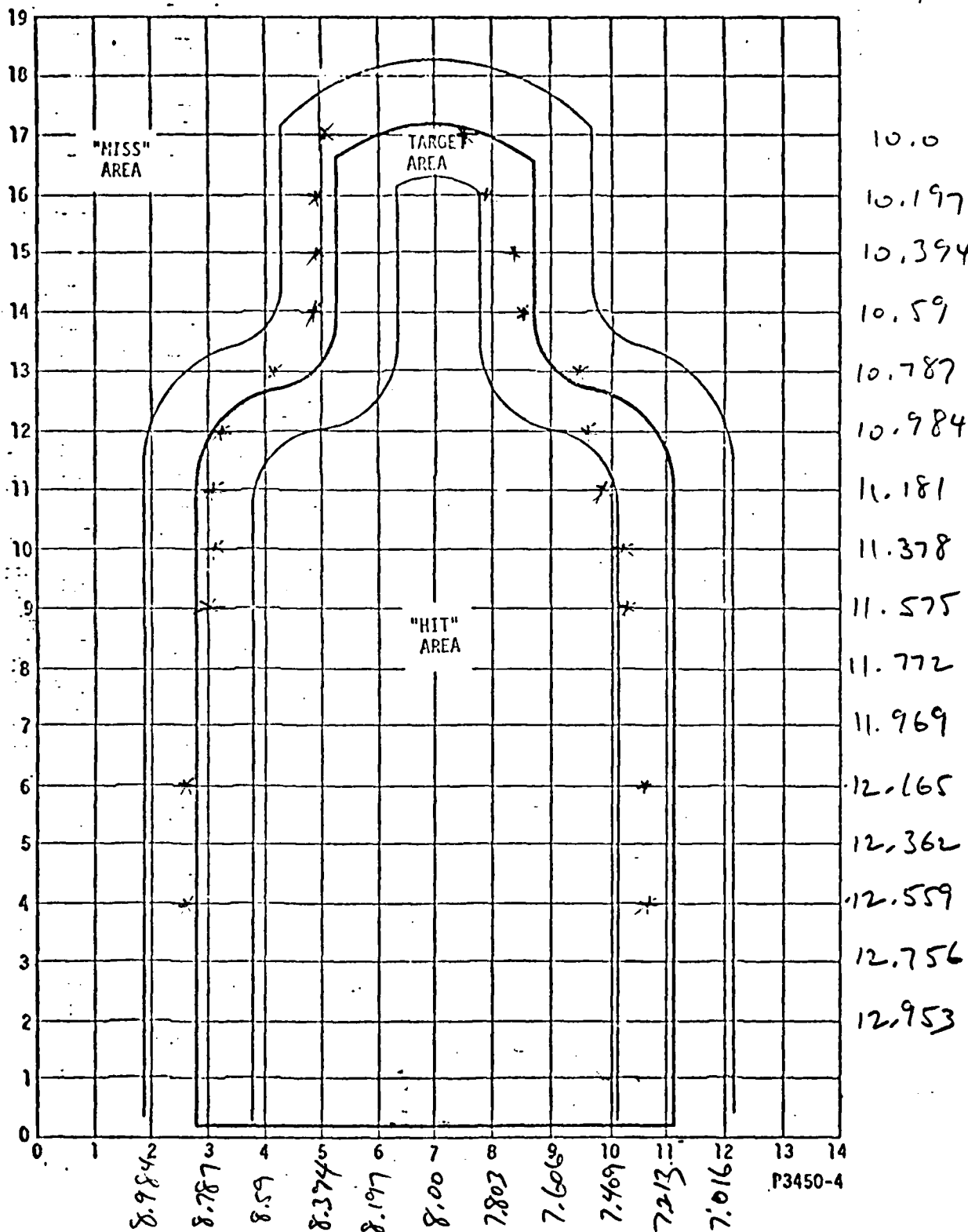
DATE

FORMED

184

DTIC

2'28.77
#4



E-Target Test Record Chart, 150 m (Sheet 4 of 4)

TEST RESULTS

SCALED

TEST CONDUCTED BY:

DR. Woods

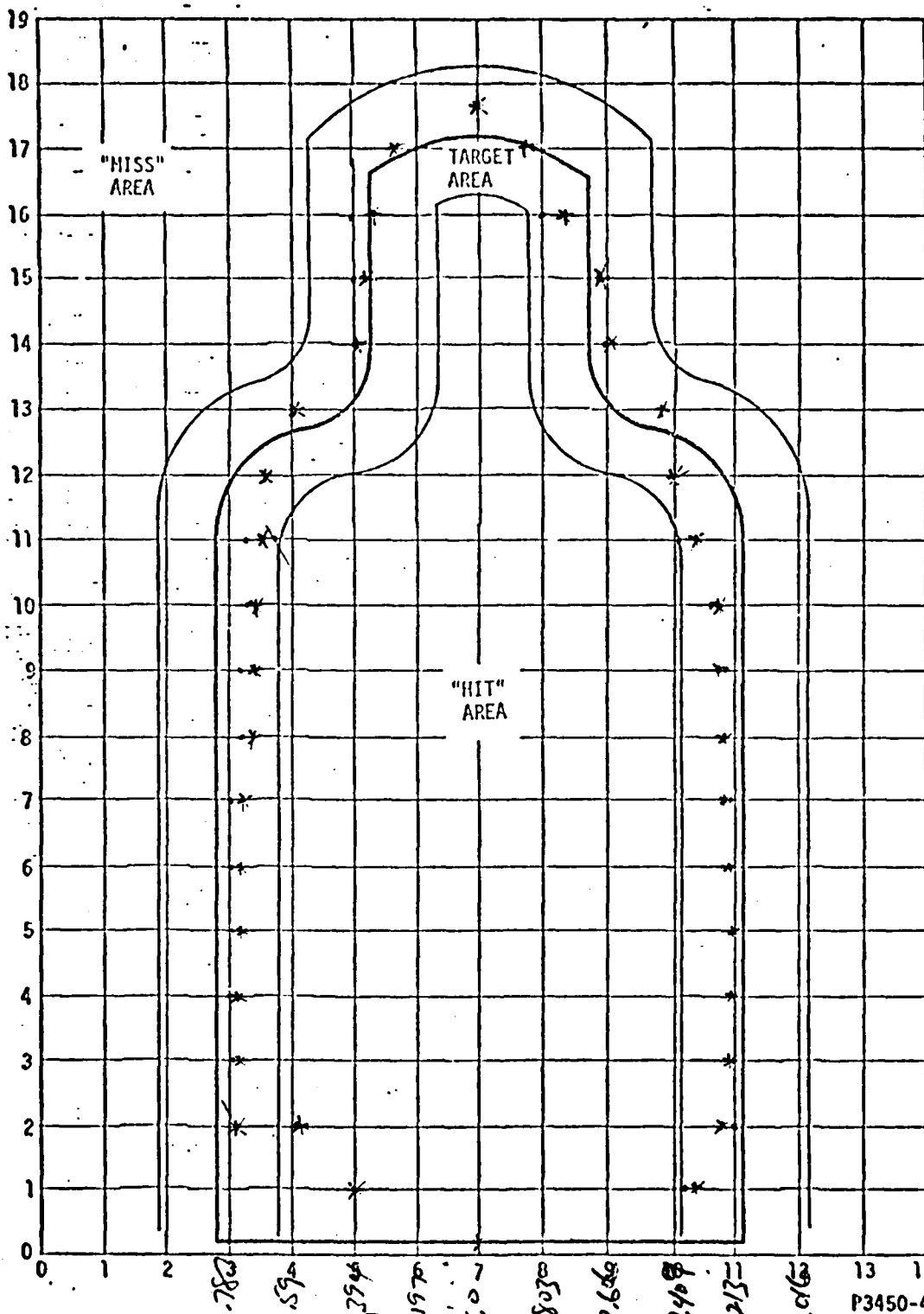
ACCEPTABLE

TEST WITNESSED BY:

PE Smith

3/1/77

TEST#1



Bore sight + x axis using west tape with 1 dir exposed to 7
 E-Target Test Record Chart, 150 m (Sheet 1 of 4)
 SCALED

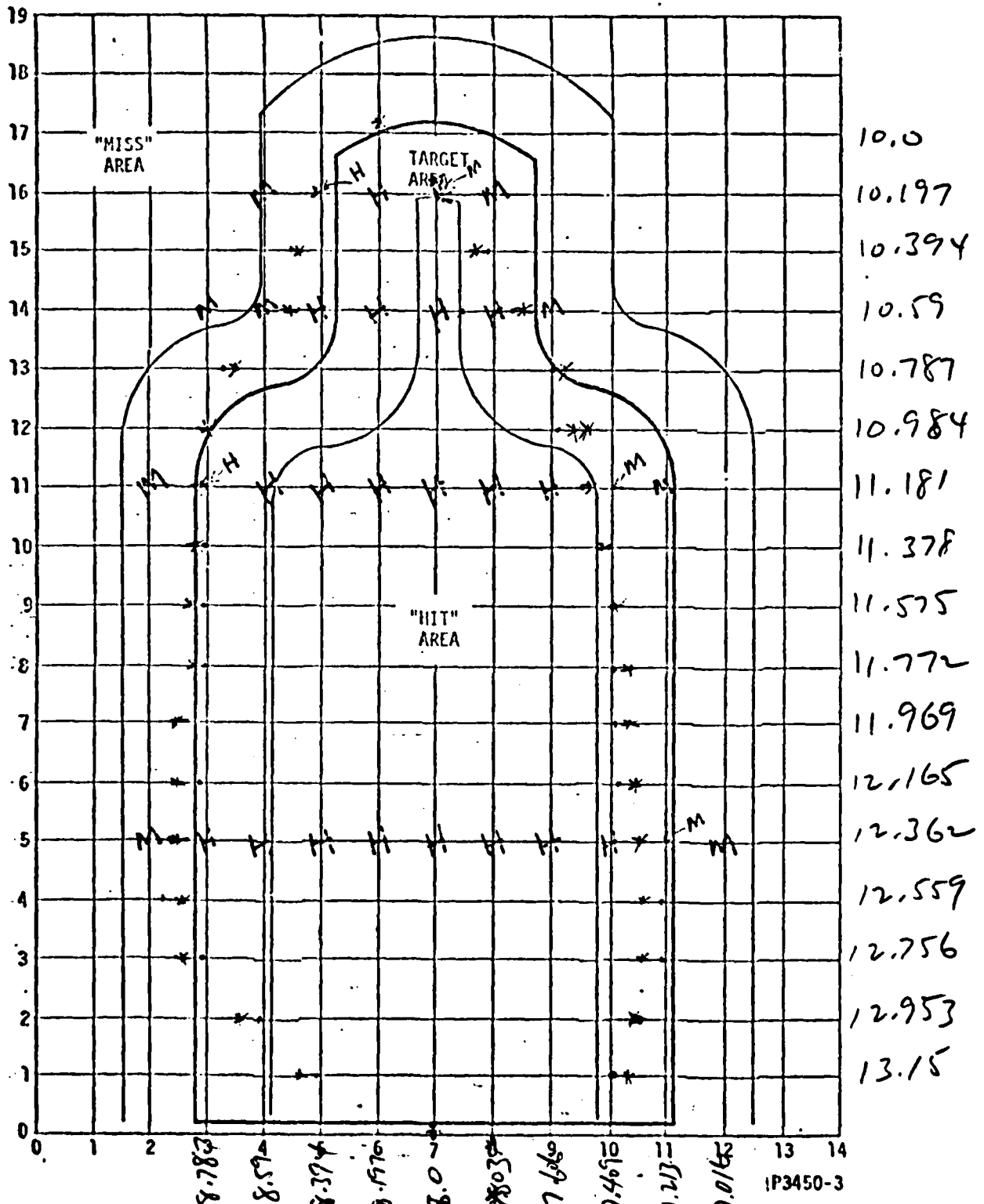
TEST RESULTS

ACCEPTABLE _____
 NOT ACCEPTABLE _____

TEST CONDUCTED BY:

TEST WITNESSED BY:

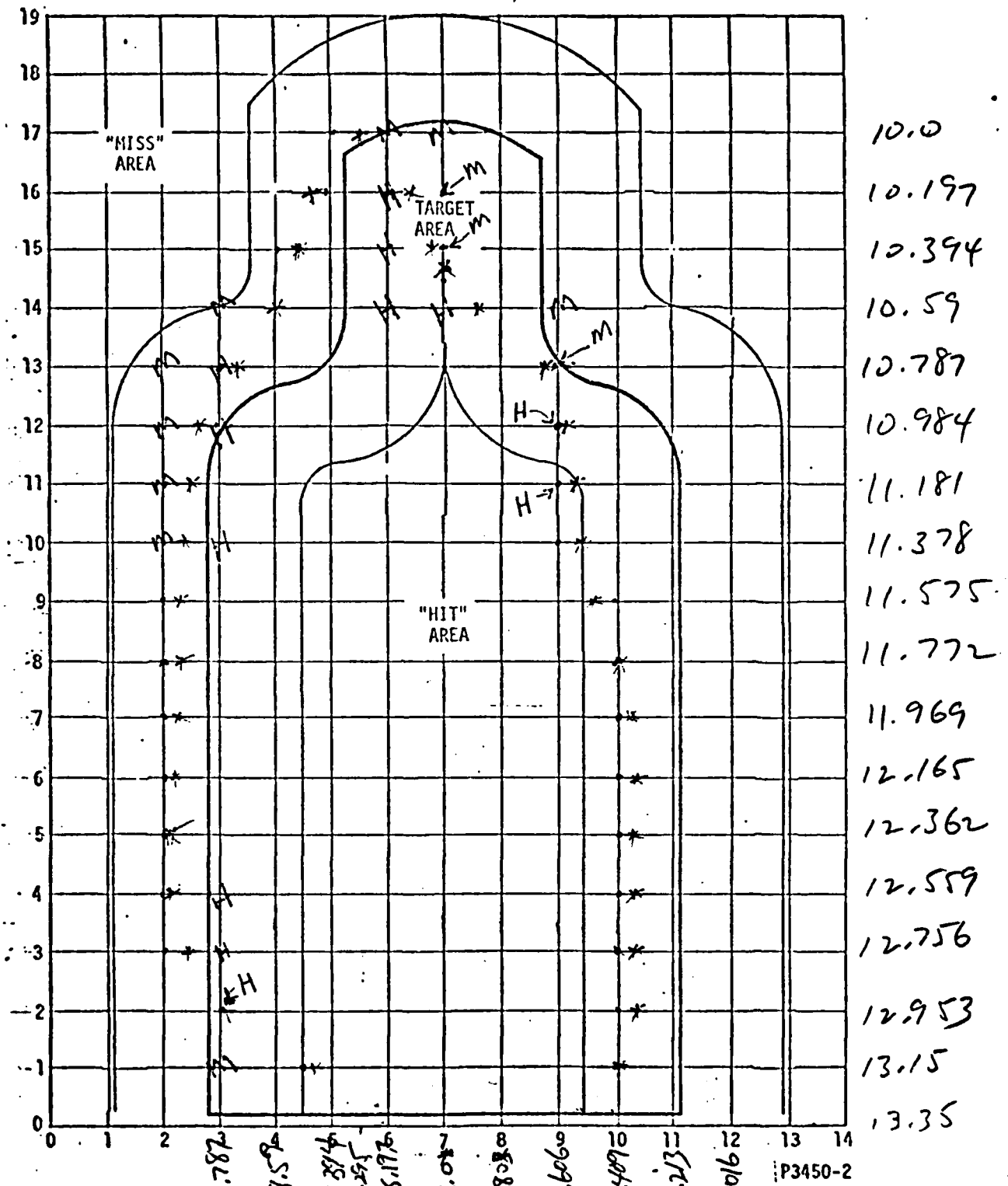
APPROVAL BY:

3/1/77
TEST 2TEST RESULTSACCEPTABLE _____
NOT ACCEPTABLE _____

TEST CONDUCTED BY: _____

TEST WITNESSED BY: _____

APPROVAL BY: _____

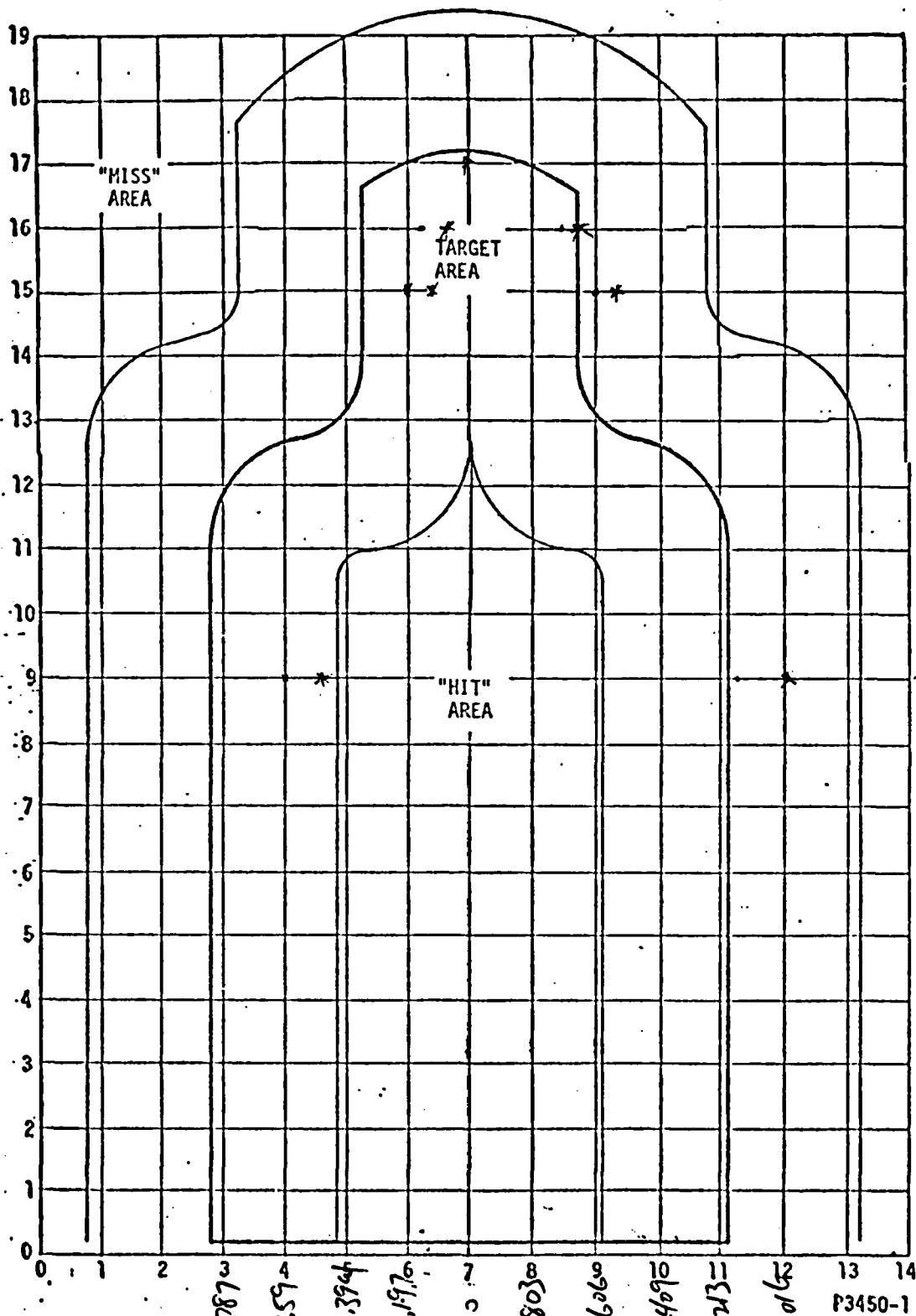
3 11 '77
TEST 3

E-Target Test Record Chart, 250 m (Sheet 2 of 4)

TEST RESULTS

ACCEPTABLE _____
NOT ACCEPTABLE _____TEST CONDUCTED BY: RLD JovTEST WITNESSED BY: [Signature]

98 APPROVAL BY: _____

3/1/77
TEST #2

E-Target Test Record Chart, 300 m (Sheet 1 of 4)

P3450-1

TEST RESULTS

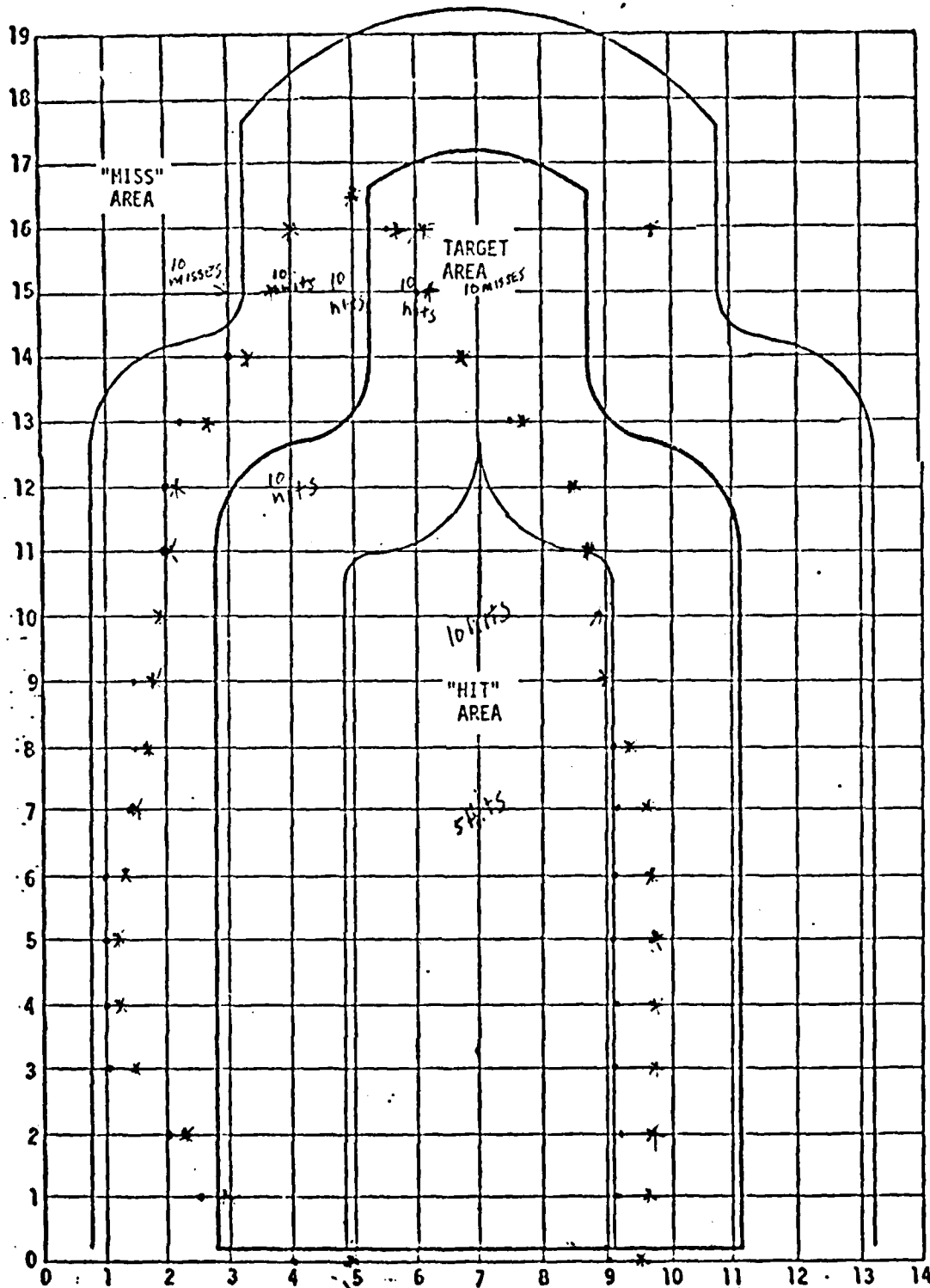
ACCEPTABLE _____

NOT ACCEPTABLE _____

TEST CONDUCTED BY: _____

TEST WITNESSED BY: _____

99 APPROVAL BY: _____

3/1/77
TEST #4
REPEAT
BORESIGHTSHOT 10
at
15-3
15-4
15-5
15-6
15-7Shot 10
hit 10 →Shot 5
→
hit 5

10.0
10.197
10.394
10.59
10.787
10.984
11.181
11.378
11.575
11.772
11.969
12.165
12.362
12.559
12.75
12.953
13.15
13.35

E-Target Test Record Chart, 300 m (Sheet 1 of 4)
SCALED

TEST RESULTS

ACCEPTABLE _____

NOT ACCEPTABLE _____

TEST CONDUCTED BY:

TEST WITNESSED BY:

100 APPROVAL BY: _____

2.6.1.2 Target Masking, Scale. Masking of targets was accomplished as follows:

F-Target - The scale F-target required no masking other than shaping the Fresnel lens to conform to the target shape.

E-Target - Target masking is as shown in Figure 1 for the 100 to 250 m scale target and in Figure 2 for the 300 m target. Actual target masking will be done by simply cutting the Fresnel lens to the correct configuration.

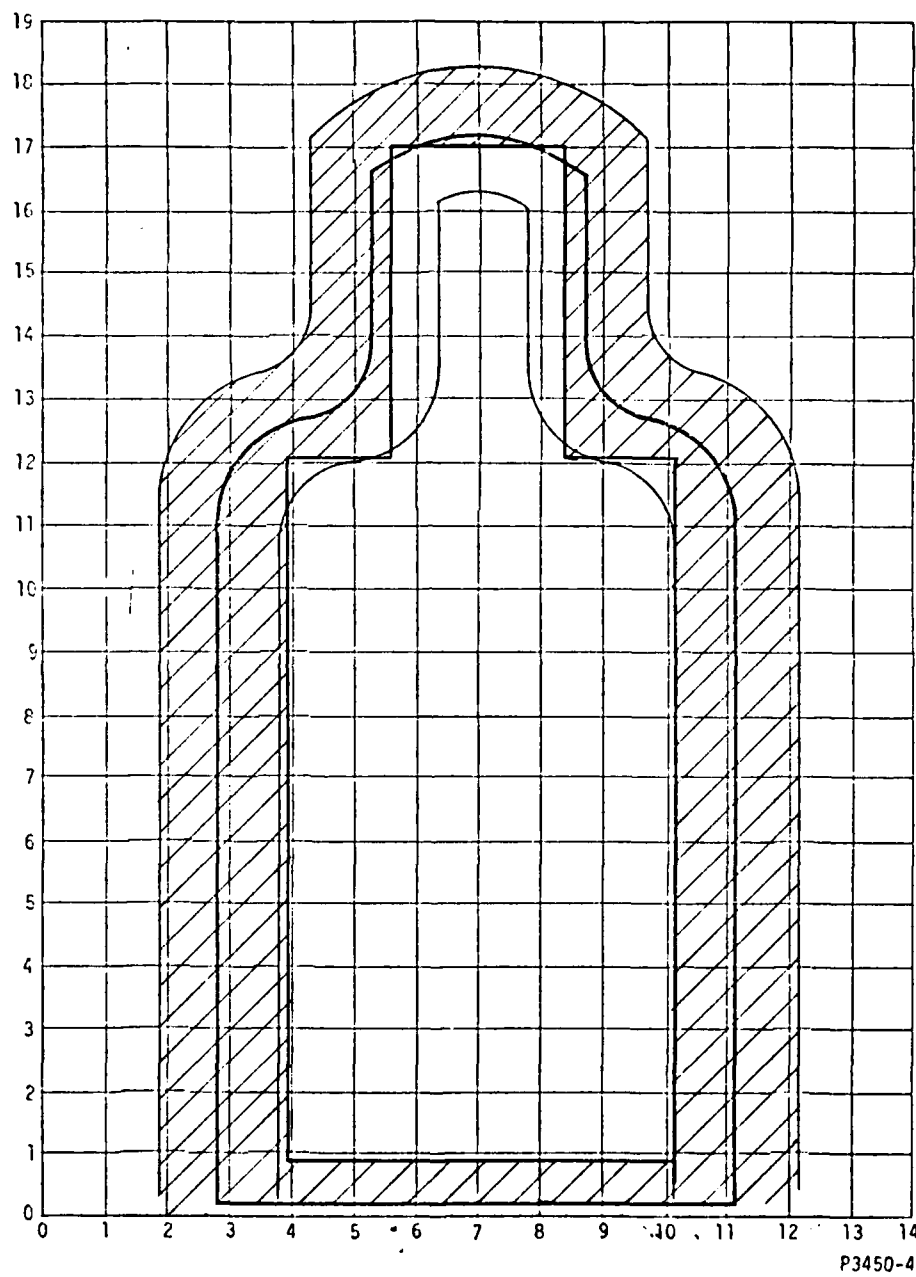


Figure 1. E-Target Mask for 100 to 250 m Scale Target

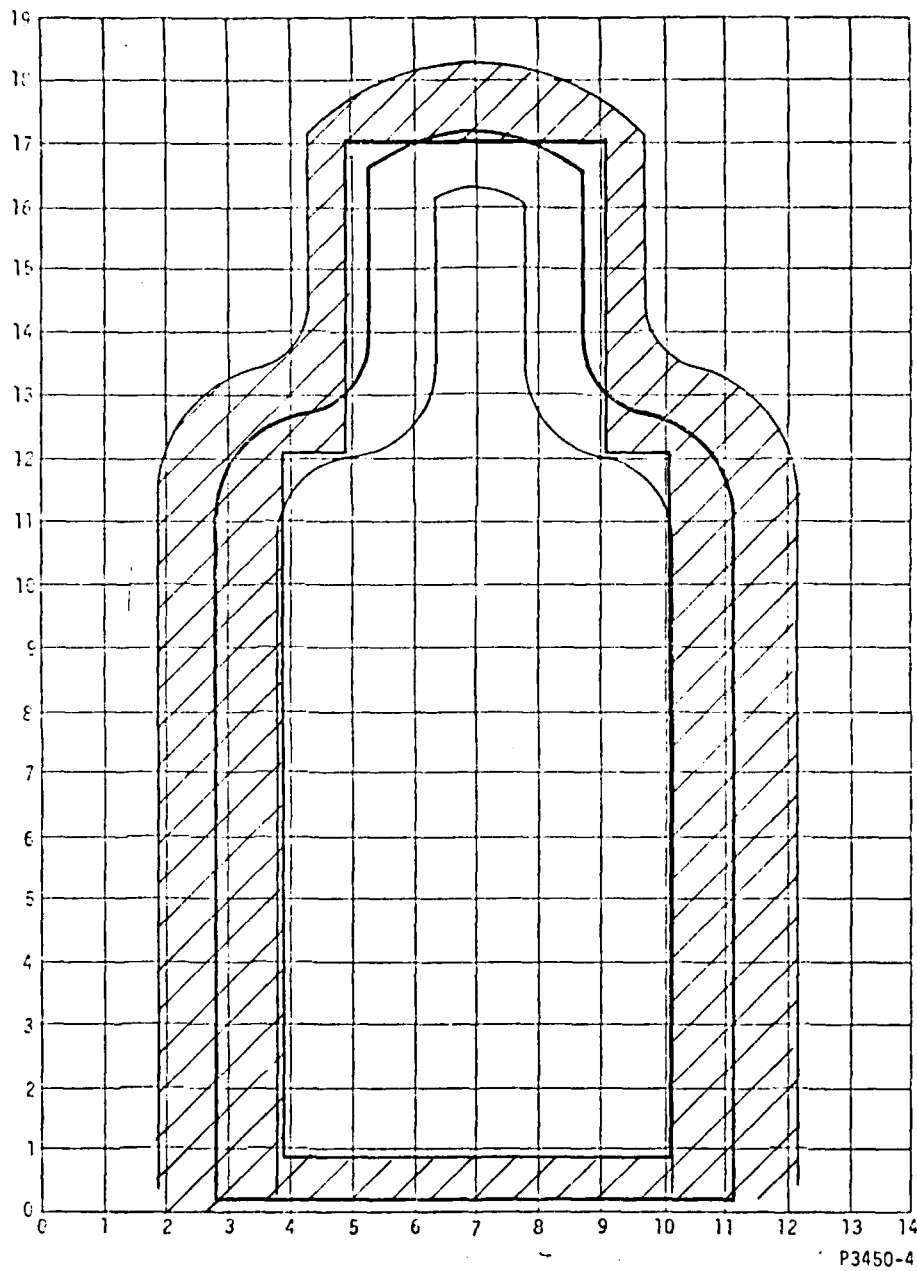


Figure 2. E-Target Mask for 300 m Scale Target

2.7 MOVING TARGET LEAD ANGLE SIMULATION DEMONSTRATION, STATIC

The test setup and procedures was as described in paragraph 2.4 of the Demonstration Test Plan with the exception of Target Pop-up and Fall (paragraph 2.4.6.1) which was modified to not include the pivot arrangement. Additionally, target speed input was not attained by a velocity function generator but was achieved by applying a voltage representing the RETS tachometer output to the lead angle servo system, and observing displacement of the detector array support.

2.7.1 TARGET LEAD, MOVING TARGET DEMONSTRATION. Lead displacements were demonstrated for ranges from 25 to 200 m (in 25 m increments) and simulated target velocities of 1.25, 1.88, 3.75 and 5 m/sec.

2.7.1.1 Test Results. Results of the test are shown in the following three test data sheets.

TYPE TEST: TARGET LEAD, MOVING TARGETDATE: 3/15/77 TIME 1445

TEST NO.	SIMULATED		MEASURED LEAD (M)	PREDICTED LEAD (M)	VARIATION	
	RANGE (M)	SPEED (M/S)			(M)	(%)
1	200	L 5 (1.0V)	1.177	1.17	+0.007	.006
2	150	L 5 (1.0V)	0.87	0.845	+0.025	.03
3	100	L 5 (1.0V)	0.573	0.542	+0.031	.057
4	75	L 5 (1.0V)	0.42	0.399	+0.021	.053
5	50	L 5 (1.0V)	0.267	0.261	+0.006	.023
6	25	L 5 (1.0V)	0.145	0.128	+0.017	.133
7	200	R 5 (1.0V)	1.18	1.17	+0.01	.009
8	150	R 5 (1.0V)	0.875	0.845	+0.03	.036
9	100	R 5 (1.0V)	0.578	0.542	+0.036	.066
10	75	R 5 (1.0V)	0.432	0.399	+0.033	.083
11	50	R 5 (1.0V)	0.282	0.261	+0.021	.08
12	25	R 5 (1.0V)	0.155	0.128	+0.027	.21
13	50	R 5 (1.0V)	0.268	0.261	+0.007	.027

TEST CONDUCTED BY: DR WoodsTEST WITNESSED BY: John H. KestlyAPPROVAL BY: ✓DATE: 3/15/77

Test Record Form, Moving Target

TYPE TEST: TARGET LEAD, MOVING TARGETDATE: 3/15/77TIME 1500

TEST NO.	SIMULATED		MEASURED LEAD (M)	PREDICTED LEAD (M)	VARIATION	
	RANGE (M)	SPEED (M/S)			(M)	(%)
14	200	L3.75 (0.75V)	0.885	0.88	+0.005	.0057
15	150	L3.75 (0.75V)	0.660	0.634	+0.026	.041
16	100	L3.75 (0.75V)	0.438	0.407	+0.031	.076
17	75	L3.75 (0.75V)	0.310	0.30	+0.01	.033
18	50	L3.75 (0.75V)	0.214	0.196	+0.018	.092
19	25	L3.75 (0.75V)	0.109	0.0963	+0.013	.132
20	25	L2.5 (0.5V)	0.077	0.0643	+0.013	.198
21	50	L2.5 (0.5V)	0.118	0.131	.013	.099
22	75	L2.5 (0.5V)	0.205	0.20	+0.005	.025
23	100	L2.5 (0.5V)	0.265	0.272	-0.007	.026
24	150	L2.5 (0.5V)	0.410	0.423	-0.013	.031
25	200	L2.5 (0.5V)	0.566	0.587	-0.021	.036
26	200	L1.88 (0.375V)	0.437	0.4417	-0.0047	.011
27	150	"	0.335	0.3188	+0.016	.051
28	100	"	0.230	0.204	+0.026	.127
29	75	"	0.174	0.1504	+0.0236	.157

TEST CONDUCTED BY: D.R. WoodsTEST WITNESSED BY: John H. Hardy

APPROVAL BY: _____

DATE: _____

Test Record Form, Moving Target

TYPE TEST: TARGET LEAD, MOVING TARGETDATE: 3/15/77TIME 1511

TEST NO.	SIMULATED		MEASURED LEAD (M)	PREDICTED LEAD (M)	VARIATION	
	RANGE (M)	SPEED (M/S)			(M)	(%)
30	50	4.88 (3.76N)	0.114	0.0854	+0.029	.335
31	25	4.88 (3.76N)	0.059	0.0483	+0.0107	.222
32	25	1.25 (0.25N)	0.037	0.0322	+0.005	.149
33	50	1.25 (0.25N)	0.055	0.0655	-0.011	.16
34	75	"	0.082	0.10	-0.018	.18
35	100	"	0.122	0.136	-0.014	.103
36	150	"	0.194	0.212	-0.018	.085
37	200	"	0.266	0.294	-0.028	.085

TEST CONDUCTED BY: DR WoodsTEST WITNESSED BY: Jack H. Haulley

APPROVAL BY: _____

DATE: _____

Test Record Form, Moving Target